Religious Media, Conversion and its Socio-Economic Consequences: The Rise of Pentecostals in Brazil*

Giulia Buccione† Marcela Mello‡

Abstract

We study the socioeconomic consequences of adherence to the Pentecostal movement, using exposure to a church-affiliated TV channel as a source of quasi-random variation in religiosity. Our empirical strategy exploits the placement of transmitters prior to the channel being religiously affiliated. Results show that exposure to this TV channel leads to an increase of 1 p.p. (+30%) in the share of Pentecostals. This large change in religious adherence allows us to study its socioeconomic consequences. Consistent with the church's prescriptions, we find that places exposed to this TV channel had higher fertility rate (0.03 child per women on average), lower female labor force participation (0.9 p.p.), lower schooling for young women (1.4 p.p.), and more votes for Pentecostal candidates (0.29 p.p.). We find no effects for male labor force participation and schooling. In an event-study framework, we exploit the expansion of RecordTV over time to show that the effects are not driven by other expansion strategies of the church. We find that the increase in the number of Pentecostal churches occurred as a result of change in content, but did not predate it, ruling out reverse causality.

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†Department of Economics, Brown University. Email: giulia_buccione@brown.edu.

‡Department of Economics, Brown University. Email: marcela_mello_silva@brown.edu. Corresponding author.

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1 Introduction

Religion significantly influences people's behaviors, yet little is known quantitatively about its causal effect on important socioeconomic outcomes. Although recently there has been progress in estimating the causal impact of religion on relevant socioeconomic outcomes (Botticini and Eckstein 2014; Campante and Yanagizawa-Drott 2015; Bassi and Rasul 2017; Squicciarini 2020; Bryan, Karlan, and Choi 2021), it remains an empirical challenge because of endogeneity in the choice of religious affiliation and participation. Historical religions, in particular, present the additional obstacle that they have long penetrated the social contexts where they spread, affecting dimensions such as institutions or culture.

The growth of new religious movements in the last decades offers an opportunity to study the effect of religion on individuals' behavior, as many of the new religious movements managed to spread relatively fast. Studies in sociology attribute part of this rapid growth to their intense use of media for proselytizing purposes (Bastian and Cunneen 1998), which provides a plausible source of variation in people's exposure to these movements.

In this paper, we study the socioeconomic effects of religious affiliation using exposure to a church-affiliated TV channel as a source of quasi-random variation in religious affiliation. Our setting exploits the rise of Pentecostals in Brazil. The Pentecostal movement is one of the fastest-growing religious movements in Latin America and Africa. It is a part of Protestant Christianity, and it emphasizes the renewing "gifts of the Holy Spirit", such as speaking in tongues, divine healing, and prophesying. Pentecostals foster more conservative practices and beliefs than other Christians that are reshaping the social identity of world Christianity (Pew Forum on Religion & Public Life (2006)). Additionally, Pentecostals intensely use media to spread their message, providing us a credible source of exogenous variation on people's exposure to this movement.

Our baseline empirical strategy exploits the initial coverage of RecordTV, a Brazilian TV channel that started broadcasting religious content in the 1990s after being purchased by a Pentecostal Bishop. RecordTV started operating in 1953 as a commercial TV channel offering music and light entertainment shows. It went bankrupt in the late 1980s[1], and it was purchased in 1990 by the Pentecostal Bishop Edir Macedo. Because the media market in Brazil is highly concentrated, being dominated by a few large companies, the bankruptcy of a major TV channel such as RecordTV was a unique isolated event. Therefore, it is unlikely that the placement of antennas in 1990 was directly functional to the expansion of the Pentecostal faith. Nowadays, RecordTV is the third-largest TV channel in Brazil. Since the purchase, RecordTV programming has shifted from a secular to a religious TV platform, relying on the Pentecostal set of values to frame the content of its religious programs, such as moralizing soap operas and Biblical documentaries. According to Campos (1997), in 1996, RecordTV aired 60 weekly hours of religious programming, while the two largest networks by the audience at that time had less than an hour per week.

We exploit the cross-sectional variation in RecordTV coverage coming from the pre-purchase set of transmitters, i.e. the ones installed before Macedo purchased the channel in 1990, that were thus inherited. In particular, we compare municipalities that were exposed to municipalities not exposed to Record TV in 1990, before the channel becoming religiously affiliated over the following decade, and analyze differences in outcomes in 2000. Although our empirical strategy reasonably assumes that this initial placement of transmitters was exogeneous to the expansion strategy of the church, RecordTV's coverage in 1990 may still correlate with other local characteristics that could have affected religious affiliation in ways other than through TV. We control for distance to the nearest transmitter, baseline municipal characteristics, various geological characteristics, and

[1] redRecordTV's bankruptcy was attributed to mismanagement.

state and metropolitan region fixed effects to address this concern.

We focus on a set of socioeconomic outcomes that are more likely to be influenced by the prescriptions of the Pentecostal church. Pentecostals advocate, for instance, for a more traditional role for women in society as homemakers and are strict regarding alcohol use by their members. Beyond these direct effects on members' attitudes, Pentecostals' influence may be exacerbated through leveraging their increasing involvement in politics. Thus, to investigate the adherence to behaviors prescribed by the church, we look at fertility rate, female labor force participation, and schooling completion by young girls. To analyze the role of religiosity in shaping political beliefs, we estimate the effect of RecordTV on votes for Pentecostal candidates.

We find that exposure to RecordTV increases the number of adherents to the Pentecostal church. Our results show that being covered by RecordTV in 1990 leads to an increase of 0.96 p.p. in the share of Pentecostals, an increase of 30% relatively to 1991, and accounts for about 15% of the total increase of Pentecostals between 1991 and 2000. Our estimates imply that RecordTV convinced between 2.3% to 11.1% of viewers to convert to the Pentecostal church, depending on the audience measure used. This large change in religious adherence allows us to study the behavioral consequences of adherence to the Pentecostal church. We find that religious media can affect religiosity and impact important economic behaviors in line with the church's prescription. Exposure to RecordTV leads to an increase of 0.03 in the average number of children per woman, a decrease of 0.9 p.p. in female labor force participation, and a reduction of 1.4 p.p. in the share of girls finishing at least middle school. We do not find any effect on male labor force participation, boys' schooling, and homicide rate. We also find an increase of 0.29 p.p. in the share of votes for candidates affiliated with the Pentecostal church. Taken together, our results suggest that the expansion of Pentecostalism leads to the adoption of more conservative behaviors.

We take several approaches to address the concern that the placement of RecordTV's pre-purchase transmitters might be related to unobserved factors that affect our outcome variables. First, we show that the original set of transmitters was not placed based on the share of Pentecostals in 1991. Second, we provide evidence that covered municipalities were not already experiencing diverging trends, as we find no evidence that exposure to RecordTV in 1990 affected our outcomes of interest at baseline (in 1991) while controlling for the outcomes in 1980. Third, to show that our results do not reflect the effect of TV exposure in general, in a statistical horse race, we test the impact of exposure to RecordTV against exposure to Globo, the largest Brazilian TV channel, finding that what matters is the former. Fourth, we attest that our results are robust to restricting the sample to progressively smaller municipalities (following Gentzkow 2006) or municipalities farther from the nearest transmitter, for which the difference in coverage is plausibly incidental from the point of view of the agent choosing the placement of the transmitters.

In addition to our main baseline strategy, we take advantage of the fact that RecordTV expanded significantly over the 1990s, and we use this variation in an event-study framework. We restrict this analysis to two outcomes that are available on a yearly basis: the number of Pentecostal churches per capita and fertility rate. Our results show that the total number of churches per capita took several years to increase following RecordTV coverage, while there is no evidence of an effect in the pre-coverage period. These findings mitigate the concern that our main results on Pentecostal affiliation could be driven by complementary expansion strategies other than RecordTV expansion, such as opening of new Pentecostal churches. If anything, it seems that the opening of Pentecostal churches only occurred several years after the arrival of RecordTV and the relative rise in Pentecostal affiliation.

Results also show that exposure to RecordTV increased the chance of giving birth only about five years after the time of first coverage. We reject that the rise in fertility

occurred before RecordTV coverage, since none of the coefficients for the years preceding the event is significantly different from zero. Although we cannot employ this empirical strategy for our other behavioral outcomes due to lack of high-frequency data, the results on fertility provide some evidence against reverse causality.

Our paper relates to three main strands of literature. Primarily, our paper relates to the branch of literature that studies the influence of religion on a varied set of behaviors.[2] While many of these studies focus on historical religions[3], we contribute to this literature by analysing the socioeconomic impacts of the expansion of the Pentecostal Church, a relatively new religion that is one of the fastest-growing around the globe. In this respect, Bryan, Karlan, and Choi (2021) document the impact of Evangelical churches on some behaviors through the randomization of an religious education program on ultra-poor Filipino households, finding no effects along several socio-economic outcomes but an increase in income and a decrease in perceived relative economic status.

This work can also be linked to the literature on the impacts of media on individuals' behaviors.[4] In general, very little is known quantitatively about the role that media play in fostering religiosity and conformance to religious behaviors. An interest-

[2]Previous papers have shown that religion influences dimensions such as trust and cooperation (Iannaccone 1998; Iyer 2016), fertility and family (Bassi and Rasul 2017), physical and mental health (Ellison 1991; Campante and Yanagizawa-Drott 2015; Fruehwirth, Iyer, and Zhang 2019), crime rates and corruption (Freeman 1986; Xu, Li, Liu, and Gan 2017), drug and alcohol use (Gruber and Hungerman 2008; Bryan, Karlan, and Choi 2021), income (Gruber 2005; Bryan, Karlan, and Choi 2021), and educational attainment (Gruber 2005; Squicciarini 2020).

[3]See for instance Michalopoulos, Naghavi, and Prarolo (2018), Botticini and Eckstein (2014), Becker and Woessmann (2009), Cantoni (2015), Squicciarini (2020), and Grosfeld, Madinier, Sakalli, and Zhuravskaya (2021).

[4]Previous research has shown that advertising (Bursztyn and Cantoni 2016), light entertainment shows (Durante, Pinotti, and Tesei 2019), and soap operas (La Ferrara, Chong, and Duryea 2012) can have important and persistent effects on various types of behavior, such as education (Gentzkow and Shapiro 2008; Kearney and Levine 2019), civic engagement (Olken 2009; Putnam et al. 2000), gender attitudes (Kearney and Levine 2015; La Ferrara and Chong 2009; Jensen and Oster 2009), health (Banerjee, La Ferrara, and Orozco-Olvera 2019), conflict and migration (Braga 2007; DellaVigna, Enikolopov, et al. 2011; Yanagizawa-Drott 2014), political orientation (Gentzkow 2006; Gentzkow, Shapiro, and Sinkinson 2011; DellaVigna and Kaplan 2007; Enikolopov, Petrova, and Zhuravskaya 2011; Adena et al. 2015; Strömberg 2004; Chiang and Knight 2011; Wang 2020), and consumption choices (Bursztyn and Cantoni 2016).

ing exception is represented by Grosfeld, Madinier, Sakalli, and Zhuravskaya (2021), who show how, after the right-wing populist party came to power, exposure to an independent TV channel in Poland has a negative effect on religious participation compared to places receiving only the pro-government state TV. In this paper, we empirically document how religious media can directly affect religiosity and induce people to convert. On top of that, our paper also documents how the promotion of specific socio-economic behaviors endorsed by the church are in fact adopted by the audience, uncovering a clear religious channel that is usually difficult to disentangle when the media under study have broader, mixed messages.[5]

Finally, our findings also relate to the question on the determinants of religious affiliation and religiosity, given that religions often incorporate costly practices individually. Taking advantage of our context, we are among the first to empirically study the choice of religious affiliation as main outcome. Several theoretical studies consider religious groups as social clubs, and religious participation as an insurance for adversities.[6] However, empirical evidence on the conditions affecting religious participation and religiosity is rather scant and mixed, and it has primarily focused on economic causes.[7] Related to our context, Costa, Marcantonio Junior, and Castro (2019) study the effect of economic downturn on the share of Pentecostals in Brazil, finding that regions more exposed to economic distress experienced an increase in Pentecostals during the 1990s and in the vote share of Pentecostal candidates. Differently from previous research, in this paper we concentrate instead on religious media, whose specificity might affect religious affiliation and believers' behavior in ways other than economic recessions and financial

[5]In an unpublished manuscript Komatsu (2019) studies the impact of the UCKG media on UCKG religious affiliation in Brazil, exploiting cross-sectional variation in contemporaneous signal strength for identification. Our paper relies on a weaker identifying assumption, and provides several robustness checks to deal with potential endogeneity in the placement of transmitters, including using only variation coming from the pre-purchase set of transmitters.

[6]See for instance Iannaccone (1992), Berman (2000), Dehejia, DeLeire, and Luttmer (2007), Ager and Ciccone (2018).

[7]See Chen (2010), Chaney (2013), and Shofia (2020).

distress.

The remainder of this paper proceeds as follows. Section 2 provides background information on the Brazilian context and the rise of the Pentecostal movement. Section 3 presents our data. In Section 4, we discuss our empirical strategy. Section 5 presents our main results and offers several robustness checks. Section 6 concludes.

2 Background

In this paper, we study the socioeconomic consequences of the rise of Pentecostals in Brazil. This relatively new religious movement has grown very fast over the last decades in Latin America and Africa. We use exposure to RecordTV, a church-affiliated Brazilian TV channel bought by a Pentecostal bishop, as a source of quasi-random variation in religiosity.

2.1 Pentecostals

The Pentecostal movement is one of the fastest-growing religious movements in Latin America and Africa. Between 1970 and 2014, they grew roughly 300% in Brazil, having reached 22% of the total population. Pentecostalism is a movement within Christian Protestantism that emphasizes the centrality of the gospel, conversion and a more personal encounter with Christ, the authority of the Bible, and the renewing "gifts of the Holy Spirit" such as speaking in tongues, divine healing, and prophesying.

In Brazil, Pentecostals tend to practice religion more often, are more conservative, and have higher actual compliance with the church's prescription than Catholics, the country's largest religious group. A survey by Pew Forum on Religion & Public Life

(2006) shows that, in Brazil, Pentecostals are strictly observant, with 86% attending church every week (vs. 32% for other Christians) and 51% reading the Scripture daily (vs. 10% for other Christians). The study shows that Pentecostals are more conservative concerning the role of women, with 61% believing that a wife has to obey her husband (vs. 42% for other Christians). They also have stronger preferences for political leaders with religious beliefs (73% vs. 63% for other Christians). Using data from the 2002/2003 Brazilian Household Expenditure Survey (POF/IBGE), Panel B of Table 1 shows that Pentecostals report spending less on alcohol, tobacco, gambling, and secular entertainment (i.e., dancing houses and motels) when compared to Catholics. The two groups do not differ in the average spending on goods unrelated to the church's prescription, such as food outside the home and transportation.

A specific feature of the Pentecostal churches is that they have intensely used a range of media channels to propagate their messages, a phenomenon known as televangelism. Several prominent scholars who studied Pentecostalism have emphasized that their expert use of mass media can largely explain the churches' growth in Brazil. Rocha (2000), for instance, noted that television was by far the preferred mass medium employed by Brazilian Pentecostals. Pew (2006) survey shows that 78% of believers use religious media (TV/radio) at least weekly, while just 34% of other Christians rely on these sources.

2.2 RecordTV

RecordTV is a Brazilian church-affiliated TV channel. It started in 1953 as a secular channel specializing in musical program production. The station met financial difficulties and declared bankruptcy in late 1980 when Edir Macedo, a Pentecostal Bishop, purchased it. Edir Macedo is the founder and leader of one of the largest Pentecostal churches in Brazil, the Universal Church of the Kingdom of God (UCKG). While the acquisition of

RecordTV was part of the church's expansion strategy, along with other investments, the opportunity to purchase a TV station was unique. Because the media market in Brazil is highly concentrated, being dominated by a few large companies, the bankruptcy of a major TV channel is an infrequent event. Nowadays, RecordTV is the third-largest TV channel in the country in terms of audience.

Since the change of ownership, RecordTV programming has relied on the Pentecostal set of values to frame the content of its religious programs. One of the most popular shows in the 1990s was "*O despertar da fé*" directly conducted by Edir Macedo. The show consisted of selected testimonies about life-changing religious experiences. Another well-established program show was "*Fala que eu te escuto*", where UCKG pastors discussed relevant social issues and blessed the audience at the end of the show with a glass of sanctified water. The religious shows were more strictly related to religious education and cult on weekends. In 1997, RecordTV started producing short soap operas with religious and moralizing content that have grown to become RecordTV's highest rating soap operas. Their most successful soap-opera "*Os Dez Mandamentos*" (The Ten Commandments) was broadcasted in 2015 and reached the highest audience rates in the country during the prime time. According to Campos (1997) estimation, in 1996, RecordTV programming had 60 weekly hours of religious content, while Globo and SBT, the two largest networks by the audience at that time, had an hour and 12 minutes, respectively.

RecordTV also has a clear political stance. In the 2018 presidential campaign, RecordTV aired the Bishop Edir Macedo blessing the candidate Jair Bolsonaro in front of nearly 10,000 faithful at the Temple of Solomon in Sao Paulo, the main UCKG worship venue.

3 Data

Our empirical work relates the exposure of RecordTV to religious affiliation and behaviors associated with the church's prescriptions - fertility, female labor force participation, crime and voting. This section describes the data used to build the signal strength measure, as well as the main outcomes of the study.

3.1 Transmitters, Signal Strength, and Coverage

Data on transmitters are available at the Brazilian National Agency of Telecommunications (ANATEL). For each transmitter, we have information on its latitude, longitude, and technical characteristics, such as frequency, power, height, broadcaster owner, and installation date. We select all transmitters that belong to RecordTV, and we make use of a professional engineer-developed software based on the Longley-Rice Irregular Terrain Model (ITM) (Hufford 2002), following Olken (2009), to compute the signal strength received by each municipality in each year.

Signal transmission obeys the laws of electromagnetic propagation. In the absence of obstacles such as mountains, air particulates, etc., the signal strength decreases with the square of the distance from the transmitter. However, decay patterns are a much more complex function of these obstacles as they diffract the signal across the space. To take into account the impact of geography on actual signal propagation, the model considers the geographic location and height of the transmitters, the frequency of transmission, and several characteristics of the surface and air. Then, the ITM algorithm computes the signal loss between each transmitter and each receiving location.[8]

Although signal strength is a strong predictor of reception (Olken 2009; Durante,

[8]We use the centroid of each municipality as the receiving location.

Pinotti, and Tesei 2019), the quality of TV does not increase linearly with the signal strength but discontinuously. That is, while above a minimum threshold, changes in the signal do not meaningfully affect reception quality. In the same way, while the signal strength is below this threshold, no reception is possible (Bursztyn and Cantoni 2016; Adena et al. 2015).

Because the minimum signal needed to get coverage depends on several devices' and environment's characteristics, we determine the critical cutoff for our setting using viewership data from the Brazilian Institute of Public Opinion and Statistics (IBOPE). This dataset contains detailed information on the monthly audience for each Brazilian TV channel in the ten largest metropolitan areas over the period 1990-1999. We aggregate viewership yearly, restricting attention to the audience for RecordTV shows exclusively.[9]

Figure 1 plots RecordTV daily average viewership against our signal strength. The dots represent the years before and after the event t = 0, which is the year when viewership becomes positive for the first time in the metropolitan region. The average signal is consistently below the -55 dB cutoff for the years in which viewership was null. It suddenly jumps above that threshold when the audience turns positive and stays at this level in subsequent years. We thus define a municipality as being covered by RecordTV when the signal is above -55 dB.

Therefore, we define our primary measure of exposure to RecordTV as a dummy indicating whether the signal is above -55 dB, a threshold suggested by both the engineering literature[10] and our data to ensure viewership. According to engineering literature, the minimum signal depends on the receiver sensitivity and local conditions. The minimum signal can vary from as high as -55 dB for a TV with poor sensitivity in a noisy

[9]Figure A3 shows the average RecordTV viewership in the ten metropolitan areas in 1999. Data is available from IBOPE.

[10]Lee et al. (2014) and Dagher et al. (2004), websites (https://otadtv.com/; http://www.aa6g.org/DTV/Noise/noise.html) and handbooks (ETSI 2014; NTSC 1994).

environment to as low as −75 dB for a TV with good reception in a low or noiseless environment. We provide sensitiveness analysis to show that results are robust to changes in the cutoff as long as it does not cross the minimum threshold.

3.2 Outcome Variables

Our outcomes of interest are derived from the 1991 and 2000 waves of the Brazilian Census[11], the Federal Electoral Authority (*Tribunal Superior Eleitoral* – TSE), the Ministry of Health (DATASUS), and the Brazilian Internal Revenue Service (*Receita Federal*). The Census is conducted every ten years and contains detailed information on demographics, income, labor market participation, education, etc. TSE data provide information on candidates' profiles, the seat they are running for, and the number of votes received in each municipality. The Brazilian IRS data contain information on the registry of companies at the time of incorporation.[12]

3.2.1 Census

To construct our measure of adherence to a specific religion, namely Pentecostalism, Catholicism, and Traditional Protestantism, we create a dummy variable indicating the person's unique self-declared religion. We keep only individuals that are at least 15 years, as they are more likely to choose their own religion than younger people.

Our measure of fertility is the number of children a woman gave birth in the given period of time. Since the age of each child in the 2000 Census is not available, we follow an approach similar to La Ferrara, Chong, and Duryea (2012)[13] and reconstruct annual

[11] We draw a random sample of 10% of individuals from each Census.

[12] Unfortunately, this dataset does not contain tax returns.

[13] Unlike the 1991 Census, the 2000 Census does not contain a variable that identifies the mother when she lives in the same household as her children. Thus, we are not able to use the same approach as

births as follows. We keep only households where there is a 15-45 year-old woman who is either the household head or spouse and assume she is the mother of all kids when there are any.[14] We retrieve the year of birth of each child by subtracting the child's age from the census year. We keep only kids born between 1991 and 2000.[15] Finally, for each woman, we compute the total number of children conceived between 1991 and 2000, and between 1981 and 1990.

As a measure of labor force participation, we construct a dummy that equals one if the person claimed to have a job at the reference period. We restrict the analysis to people between 20 and 60 years when they are more likely to have already finished school and not retired yet.[16] For school completion, we restrict the analysis to 13 to 18 year-old individuals and create a dummy indicating if they completed at least middle school.[17] The expected age of middle school completion in Brazil is between 14 and 15 years old.

3.2.2 Tribunal Superior Eleitoral - TSE

Our measure of electoral outcomes is the share of votes received by Pentecostal or Catholic candidates in a municipality in each election. We classify a candidate as belonging to the Pentecostal or Catholic church if the candidacy alias, chosen by the candidate at the moment of candidacy registration, contains designations that can be associated with the respective church. We associate the designations *Pastor*, *Irmão*, *Reverendo*, or *Bispo* (and

La Ferrara, Chong, and Duryea (2012).

[14] When there are kids in the household but the woman reports having had zero live births, we drop the household from the analysis

[15] We exclude kids born before 1991 because pregnancy must have happened before RecordTV was religiously affiliated.

[16] The definition of employment status changes between 1991 and more recent waves. While in the 1991 Census, the reference period is the 12 months before assessment, in 2000, it is the census reference week. We follow Dix-Carneiro and Kovak (2017) and Hirata and Soares (2020) and define the employment status dummy as follows: in 1991, the dummy is equal to one if the person regularly worked during the previous 12 months; and in 2000, the dummy equals one if the person, in the reference week, either worked (for pay or not) or had a job but did not work for any reason.

[17] We also test for high school completion, finding similar results.

its feminine version) to the Pentecostal church and *Padre*, *Pr.*, *Frei*, *Monge*, *Diácomo*, and *Vigário* to the Catholic church, following Costa, Marcantonio Junior, and Castro (2019). We use information from the 1998, 2002, and 2006 Federal elections[18] and restrict our analysis to candidates running for "*Deputado Federal*" seats (Federal Representatives).

3.3 Brazilian IRS

As an alternative measure of religion, we derive the number of Pentecostal churches present in each municipality-year, using data from the Brazilian IRS. These data contain information on formal firms, including the initial date of operation, location, sector, and name. We classify a church as Pentecostal if its name matches any official Pentecostal denomination, such as "*Convenção da Assembleia de Deus no Brasil*", "*Assembleia de Deus Vitória em Cristo*", "*Igreja Pentecostal Deus é Amor*", etc..[19]

3.4 Health Data - SIM/SUS

Our measure of crime is the number of homicides per capita, derived from SIM/DATASUS, available for all municipalities yearly. We classify homicides according to the ICD code, published by the WHO.[20]

[18] Unfortunately, microdata before 1994 does not contain information on candidates' profiles.

[19] We use the list of Pentecostal denomination available at https://pt.wikipedia.org/wiki/Lista_de_denomina%C3%A7%C3%B5es_protestantes_no_Brasil.

[20] The ICD code changed in 1996, but the series remain comparable. We follow Dix-Carneiro, Soares, and Ulyssea 2018 and use the following codes. From 1980 through 1995, we use the ICD-9 (categories E960–E969), and from 1996 through 2010, we use the ICD-10 (categories X85–Y09).

4 Baseline Empirical Strategy

We estimate the effect of exposure to RecordTV, a church-affiliated TV channel, on religiosity and behaviors consistent with the church's prescriptions.

Our empirical strategy exploits the coverage of RecordTV before it being religious-affiliated. A feature of our empirical setting is RecordTV's switch in content from secular towards religious programs after the purchase by Bishop Edir Macedo in 1990. Therefore, it is unlikely that the previous placement of this original set of transmitters was especially advantageous for the expansion of the Pentecostal faith, since the pre-purchase channel had a secular platform.

Given that the bankruptcy and opportunity of buying a TV channel is a rare event, it is unlikely that the previous placement of transmitters was especially advantageous for the expansion of the Pentecostal faith.[21] However, the initial placement of these transmitters might still be correlated with different socioeconomic characteristics, such as income or economic activity, that could also influence our outcomes of interest. For instance, since RecordTV might have placed its transmitters in more central areas, such as places with better infrastructure, the distance to these municipal centers could be affecting our outcomes through channels other than RecordTV coverage itself. To account for that, we control for the signal in the free-space, which is a function of the distance to the nearest transmitter. Moreover, we additionally control for a range of municipalities' socio-economic characteristics at baseline, including the outcomes.

[21] A potential concern about our empirical strategy is that the bankruptcy of RecordTV was driven by economic downturns in covered places. Since economic downturns can also foster religiosity (Costa, Marcantonio Junior, and Castro 2019), then our empirical strategy could be picking up the effect of economic downturns on religiosity. Because RecordTV bankruptcy was due to mismanagement, it is unlikely that our results are driven by economic downturns. Still, we test for this hypothesis by adding the municipal change in the income per capita between 1980-1991, and find no evidence that results are driven by local economic downturns, as the outcomes of interest are largely unchanged after the inclusion of this control.

Specifically, we estimate the following equation:

$$Y_m^{2000} = \beta_1 \cdot Coverage_m^{1990} + \beta_2 \cdot Propagation\ Controls_m + \beta_3 \cdot Y_m^{1991} + \beta_4 \cdot X_m^{1991} + \delta_{state(m)} + \delta_{MR(m)} + u_m, \quad (1)$$

where Y_m^{2000} is the outcome in municipality m in 2000, $Coverage_m^{1990}$ is a dummy indicating if municipality m was covered in 1990. $LandControls_m$ includes municipal-level variables that influence the signal propagation: area, height, ruggedness, and signal in the free-space coming from RecordTV's transmitters in 1990, as well as their squares, [22] and the municipal latitude and longitude. X_m^{1991} is a set of municipal-level characteristics measured at the baseline described in Table 2. We also control for state fixed-effects, $\delta_{state(m)}$, to capture unobserved characteristics common to municipalities of a given state. We also control metropolitan regions dummies, $\delta_{MR(m)}$.[23] u_m is the error term. We cluster the standard errors that the meso-region level, $meso(m)$.

The coefficient β_1 provides the estimated effect of exposure to RecordTV. Our identifying assumption is that, conditional on the covariates in equation 1, RecordTV coverage before becoming religious-affiliated is not correlated with unobserved factors that influence religiosity, labor market outcomes, fertility, and voting. Although untestable, we provide support to this assumption through balance and falsification tests.

Table 2 shows the correlation between RecordTV's coverage in 1990 and municipal socioeconomic characteristics at the time. In Column (2), we regress coverage on these characteristics. As expected, the initial coverage is higher in places that are richer, more developed, and endowed with better infrastructure. When we control for state and metropolitan region fixed-effects, and for variables related to the propagation of the signal

[22] We include squares to control for non-linear effects of our propagation controls following the literature (CITE)

[23] There are ten metropolitan areas.

(area, height, ruggedness, and the signal in the free-space and their squares), coverage becomes balanced across municipal characteristics, as shown in Column (4). Jointly, these controls explain about 50-85 percent of the overall variation in most of the socio-economic variables in 1991.

Furthermore, we show that RecordTV's coverage in 1990 was not correlated to any of our outcomes of interest in the past.[24] Specifically, we estimate Equation 1 using the outcome variables in 1991 and controlling for them in 1980. This falsification exercise, shown in Table 3, provides support to the hypothesis that changes in religiosity and behaviors were not related to factors correlated with coverage *per se* other than the change in content since in 1990 the inherited transmitter started programming religious content during the 90s after RecordTV purchase.

Finally, we check that the placement of RecordTV's initial set of transmitters was not correlated to the share of Pentecostals in 1991 to mitigate concerns that our outcome might be triggering the treatment. The results are displayed in Table 8. In column (1), we regress the dependent variable on the average share of Pentecostals in 1991 without any other control. Although the coefficient on Pentecostals in 1991 appears to be positive and significant, as soon as we add state and metropolitan region fixed-effects (column (2)) and controls for the initial level of the other variables (column (3)), the correlation disappears.

5 Results

This section reports the results of exposure to RecordTV on religious affiliation and behavioral changes consistent with the church's prescription. In particular, we look at

[24] We are unable to perform this exercise for voting because microdata is only available after 1998, as explained in the Data Section.

fertility, labor force participation, schooling, homicides, and voting.

5.1 Pentecostal Affiliation

Table 4 reports the estimated effects of exposure to RecordTV on the share of Pentecostals using our baseline empirical strategy. We find that exposure to RecordTV increases the share of self-identified Pentecostals. Column (1) shows a positive unconditional association of 0.8 percentage points between RecordTV coverage and the share of Pentecostals, although statistically not significant. In column (2), we control for signal propagation variables (the distance to the nearest RecordTV transmitter, ruggedness, height, area, and their squares) and find that getting covered by RecordTV increases the share of Pentecostals by 1.9 percentage points. In column (3), we include the set of unbalanced controls from Table 2, finding the same results as in column (2). In column (4), we add state-level fixed effects and a dummy to identify metropolitan regions, while in column (5), we further control for the share of Pentecostals at baseline. In column (6), our preferred specification, we estimate the full model described in Equation 1 by adding municipality characteristics described in Table 2. In this specification, being covered by RecordTV increases the municipal-level share of Pentecostals by 0.96 percentage points, an increase of about 30% from the baseline level (3.01%).

5.2 Behaviors

The large change in the share of Pentecostals allows us to study the behavioral consequences of the expansion of Pentecostalism. Since Pentecostals advocate for a more traditional role for women in society, we look at fertility rate, female labor force participation, and schooling completion by young girls. Moreover, as Pentecostals have increased their

political involvement during the years, we study the share of votes for Pentecostal candidates. Overall, Table 6 shows that places exposed to RecordTV exhibit higher adherence to behaviors consistent with the churches' prescriptions.

The Pentecostal church holds that women are primarily mothers and homemakers. Moreover, it strongly condemns abortion and emphasizes motherhood as a blessing for married couples. Accordingly, column (3) of Table 6 suggests that places exposed to RecordTV had an increase of 0.03 in the average number of children per woman, statistically significant at 5% level, an increase of 2% from the baseline level.

Moreover, the Pentecostal church emphasises the role of men as the head of the household and main breadwinners, and women as homemakers. We analyze whether followers adopt this behavior by looking at female and male labor market participation, respectively in columns (1) and (2) of Table 6. We find that exposure to RecordTV decreases female labor force participation by 1 p.p., significant at 5% level. Interestingly, we find a small and not statistically significant effect for male labor force participation.

Although there is heterogeneity on Pentecostal churches' views about education, several denominations highlight that women should not have more education than their husbands. We analyze this behavior by looking at the share of boys and girls that finish at least middle school,[25] and observe a decrease of 1.4 p.p. in the share of girls completing at least middle school (column (4), Table 6), and no effect for boys (column (5), Table 6).

Lately, Pentecostal religious leaders have increased their participation in politics significantly. In 2021, 195 of 513 federal deputies in Brazil belonged to the Evangelical lobby. The large involvement of Pentecostals in politics may be motivated by their goals of opposing to gay rights, abortion, remaining tax-exempt, besides being a way to deal with religious competition (*The Economist* magazine, June 5th 2021 Edition). Our results

[25]Because the expected age to finish middle school is between 14 and 15 years-old, we restrict the analysis to people between 13 and 18 years-old to allow for people finishing earlier or a few years later.

reflect this tendency. In column (7), Table 6, we find an increase of 0.29 p.p. in the share of votes for Pentecostal candidates running for "Deputado Federal". Since the "Deputado Federal" is elected at the state level and our specification includes state fixed effects, our results cannot be explained by a higher number of Pentecostal candidates running for those seats, but by a more intensive amount of votes for Pentecostal candidates.

6 Robustness & Interpretation

The literature suggests that most of the Pentecostals converted from Catholicism rather than from Traditional Protestantism, atheism, or agnosticism (Coutinho and Golgher 2014). According to a survey conducted in São Paulo by Data Folha in 1996, 60% of all Pentecostals were Catholic before, 22% did not have any religion, and 7% belonged to Afro-Brazilian religions. Also, 60% of all conversions happened within the previous six years.

Since the population of Brazil is largely Catholic, as a counterfactual, it is credible to assume that an individual would have remained Catholic had no conversion occurred. We test for this hypothesis by estimating the effect of exposure to RecordTV on Catholics and Traditional Protestants. Column (1) of Table 5 shows a negative effect of exposure to RecordTV on Catholic affiliation. Column (2) shows no effects for Protestants.

The rise in Pentecostalism induced by RecordTV might be understood as resulting from individuals changing their religious affiliation over time, i.e., by conversion, or, at least partly, by younger cohorts adopting Pentecostalism in the first place, i.e., by replacement. We test for this hypothesis by examining whether young adults raised Catholics are more likely to self-declare Pentecostals in places where RecordTV is available. We assume that a person is raised Catholic if the parents self-identify as Catholic. Therefore,

if the individual declares a different religion from their parents' one, we interpret this as a better proxy for individual conversion. We then focus on the sub-sample of above 15-year-old "converted" individuals and aggregate data at the municipal level. Column (3) of Table 5 shows the analysis for this sub-sample, where the coefficient is positive and significant at the 1% level, however, the magnitude is smaller than in the main results suggesting that part of unaccounted change in Pentecostal affiliation might be driven by a replacement story.

We also analyze the presence of Pentecostal churches in the municipalities. Column (4) of Table 5 shows that exposure to RecordTV leads to an increase of 3.8 p.p. in the chance of the municipality having at least one Pentecostal church, statistically significant at 1%. We also look at the number of churches per capita (in log) and find a positive effect of 4.4%, although this result is not statistically different from zero (not shown).

One potential concern about our empirical strategy is the possibility that the church, in its expansion strategy, started investing additional resources, such as media other than TV, churches' premises, etc., prioritizing areas that were already covered by RecordTV in 1990. If this is the case, our results may not be driven by RecordTV's content per se, but instead by a bundle of church's investments to penetrate in treated areas. As discussed in the Context section, bishop Macedo, and RecordTV channel accordingly, is specifically affiliated to the UCKG church among the realm of Pentecostal denominations of Brazil. Thus, to mitigate the outlined concern of UCKG strategies complementary to RecordTV coverage, we include all Pentecostal denominations when studying effects on the number of churches or religious-affiliation, not only focusing on UCKG which is directly associated to RecordTV, as explained in the Data section. Moreover, as discussed in section 6, we attempt to further mitigate this concern by showing, in an alternative empirical strategy with higher frequency data at the year level, that the increase of Pentecostal churches only took place a few years after the entrance of

RecordTV in the municipality. We interpret this as evidence that, at least for a specific kind of church's investment, there does not seem to be complementarities between RecordTV penetration and opening of churches in Pentecostal expansion strategy.

6.1 Robustness

A potential concern about our empirical strategy is that it might fail to disentangle the effect of RecordTV from the effect of exposure to TV in general. To address this concern, we add exposure to the largest Brazilian TV channel, Globo, in our baseline regression for each outcome of interest. Table 7 reports these results, showing that the effects of exposure to Globo are much smaller in magnitude and statistically insignificant, while the estimates for exposure to RecordTV remain unremarkably similar in magnitude and statistical significant as in the baseline. We take this as evidence that exposure to RecordTV programming, instead of exposure to TV programs in general, is driving our results.

Since RecordTV may have preferentially targeted larger municipalities in its early strategy, reaching the smaller surrounding municipalities may be of relatively little value, and differences in RecordTV access between them are plausibly incidental from the point of view of the agent choosing the placement of the transmitters. To test for this hypothesis, we exclude the state capitals from the analysis and progressively restrict the sample to smaller municipalities. Therefore, in this exercise we compare smaller municipalities that should be more similar in terms of observable and unobservable variables. Alternatively, we exclude from the sample the places where the transmitter is located and progressively remove the surrounding municipalities. In this way, we aim to remove the municipalities that were initially targeted by RecordTV's 1990 coverage strategy. Results of these exercises are presented in Table 9. Overall, the coefficients remain stable and comparable

with our benchmark estimation (column (6) of Table and 4 and Table 6).

Finally, we test the sensitivity of our main results to different cutoffs for coverage. According to the engineering literature, the minimum signal needed to ensure viewership ranges from as high as -55 dB for a TV with poor sensitivity in a noisy environment to as low as -75 dB for a TV with good reception in a low or noiseless environment. Figure 2 shows that the coefficient for the share of Pentecostals does not change if we decrease the cutoff up to -65 dB. After that, the coefficient drops sharply to zero, and it remains at this value. When we increase the cutoff, there is no change in the coefficient up to -50 dB. After that, there is a slight decrease in the magnitude, which remains stable until -35 dB, when it asymptotes to zero. Our results are thus robust to changes in the cutoff as long as it does not cross the minimum coverage thresholds.

6.2 Persuasion Rate

Given our findings, it is worth understanding what fraction of the overall increase in Pentecostals was attributable to exposure to RecordTV. We implicitly estimate the share of people induced by RecordTV to convert to the Pentecostal church by computing the persuasion rate (DellaVigna and Kaplan 2007). The persuasion rate captures the effect of the treatment on the relevant behavior, adjusting for exposure to the message and for the size of the population left to be convinced in the initial period, according to the following expression:

$$f = \frac{y_T - y_C}{e_T - e_C} \cdot \frac{1}{1 - y_0,}$$

where $y_T - y_C$ corresponds to the change in Pentecostal affiliation as a result of the expansion of RecordTV signal, which is captured by $\hat{\beta}_1$ in equation 1 and reported in Table 4; $e_T - e_C$ is the effect of the signal on viewership; finally, the denominator of the

last term represents the non-Pentecostal population in 1991, which amounted to 96.5%.

This exercise is useful since it provides us with a measure that can be compared to other studies' results. However, the nature of our viewership data is somewhat different from what is often used in the literature, making such comparison difficult without some assumptions. While our viewership measure represents the monthly average share of households connected to a given TV channel during a two-hour time interval in a day of the week, most of the relevant studies make use of discrete measures, such as a dummy indicating whether the surveyed individual watched a given channel for a certain amount of time per day (DellaVigna and Kaplan 2007). In order to overcome this issue, we construct two alternative measures of viewership based on different assumptions, that allow us to compute an upper- and lower-bound of the persuasion rate.

First, we assume that people watch RecordTV at most two hours a day. Thus, in each two hours-time slot there are different viewers. We then construct our measure of viewership by summing all the households within a day that were connected to RecordTV, and taking the average across days of the week and months to obtain an annual estimate of viewership.[26] Column (1) of Table 11 reports the estimated value of $e_T - e_C$ using this measure of viewership. The expression above gives us a persuasion rate equal to 2.4%, and is the lower bound of our persuasion rate.

Second, we construct an alternative measure of viewership by taking the maximum number of households across the two-hours slots within a day that were connected to RecordTV, and take the average across days of the week and months to obtain an annual estimate of viewership.[27] Using the estimated coefficient of $e_T - e_C$ for this alternative

[26] Since we are assuming that these households are the only ones watching TV over this period, this measure might still underestimate the actual number of viewers, and thus the lower bound's persuasion rate might still be overestimated.

[27] This measure is very conservative, as we assume the that the only people watching RecordTV were the ones connected during the time slot with the highest audience.

measure (column (2) of Table 11), the persuasion rate is equal to 11.1%, which is the upper bound of our persuasion rate. Both the lower and upper bound rates are comparable to values found by the relevant literature on persuasion (see DellaVigna and Gentzkow 2010).

7 Expansion of RecordTV

Since RecordTV expanded over the 1990s, we take advantage of this variation over time to estimate the effects of RecordTV exposure in an event-study framework. While some of our outcomes are measured at a few points in time, the number of Pentecostal churches, fertility, and homicides are high-frequency data, available on an yearly basis. We therefore analyze the evolution of this set of high-frequency outcomes with respect to RecordTV's expansion over time. Results from this alternative empirical strategy are aligned with baseline findings.

7.1 Event Study

This identification strategy exploits the expansion of RecordTV over time (see Figure 3). We use a staggered difference-in-differences strategy, and compare the outcomes of interest of municipalities that were covered by RecordTV for the first time during the 1990s with those covered after 2000[28] and that were not, therefore, treated during our study period. We exclude municipalities that were already covered in the pre-period, i.e. before 1990.

Recent evidence suggests that "staggered access" estimations might be biased by heterogeneous effects over time (Callaway and Sant'Anna 2021; De Chaisemartin and d'Haultfoeuille 2020). To address this concern, we estimate the parameter of interest

[28]Nowadays, close to a hundred percent of municipalities are covered by RecordTV.

following Callaway and Sant'Anna (2021). More formally and adopting Callaway and Sant'Anna (2021)'s notation, denote by C the group of municipalities that were not covered during the 1990s, and by G_g the group of municipalities that were covered at some point in the study period. Let g indicates in which period each municipality received the coverage. Let e denotes event-time, i.e., $e = t - g$ denotes the time elapsed since treatment was adopted. Our parameter of interest is given by

$$\theta(e) = \sum_{g \in \mathcal{G}} \mathbf{1}\{g + e \leq \mathcal{J}\} P(G = g | G + e \leq \mathcal{J}) ATT(g, g + e) \tag{2}$$

where

$$ATT(g, t) = E[Y_t - Y_{g-1} | G_g = 1] - E[Y_t - Y_{g-1} | C = 1]$$

and $P(G = g | G + e \leq \mathcal{J})$ indicates the probability of being treated for the first time at time g.

Thus $\theta(e)$ is the average effect of being exposed to RecordTV e time periods after the treatment was adopted across all municipalities that are observed to have ever participated in the treatment for exactly e time periods. We cluster the standard errors at the municipal level, and weight the observations by the population in 1991.

7.2 Results

Figure 4 displays the coefficients of a full set of dummies going from seven years before the introduction of RecordTV in a given municipality to seven years after. The findings show that the total number of per capita churches increases in the years following RecordTV coverage, and the rise takes several years to take off. This later effect provides evidence against the hypothesis that our results are driven by complementary Pentecostals' expansion strategies other than TV, such as opening of new churches. Also, there is no

evidence of an effect in the pre-coverage period, suggesting that the rise in the number of Pentecostal churches did not predate RecordTV's arrival in a given municipality.

For fertility, Figure 5 shows that exposure to RecordTV increases the chance of giving birth only after about four years from RecordTV entry in an area. Also, the rise in fertility does not occur before RecordTV coverage, since none of the coefficients for the years preceding the event is significantly different from zero. After that, there is a positive increase in fertility.

7.3 Selection

In this section, we examine the determinants of coverage of RecordTV over time after it becoming religiously affiliated. We show that the placement of new transmitters was not based on the share of Pentecostals in 1991, but on geographical and other socioeconomic characteristics of the municipalities.

Since RecordTV is a commercial broadcaster, it might have placed its transmitters targeting specific areas, such as places that were richer or growing more quickly to yield profits from advertisements, resulting in systematically different trends across covered and non-covered areas. Likewise, if the transmitters were placed following the initial share of Pentecostals, then our outcome might be triggering the treatment. For instance, if RecordTV targeted places with more Pentecostals in order to ensure higher audience or higher conversion to Pentecostalism, then the effect we estimate might be overestimating the actual one. We can test whether the expansion of RecordTV to a given municipality in 2000 is correlated with Pentecostal affiliation at the beginning of the period, i.e. in the 1991 Census, estimating the following regression:

$$Coverage_m^{2000} = \alpha_1 {}_m^{1991} + \alpha_2 \cdot X_m^{1991} + \alpha_3 Pentecostal_m^{1991} + \alpha_4 LandControls_m + \eta_{state} + \eta_{MR} + \nu_{meso(m)},$$

where $Coverage_m^{2000}$ is the maximum signal strength that municipality m received in 2000. $Pentecostal_m^{1991}$ is the share of Pentecostals in municipality m in 1991; X_m^{1991} is the vector of controls used in our baseline specification, described in 2, $LandControls_m$ are the propagation variables (area, height, ruggedness, and distance to nearest transmitter in 1990, and their squares); η_{state} are state fixed effects; η_{MR} is a dummy indicating whether the municipality belongs to a metropolitan region; and ν_m is the error term. Standard errors are clustered at the meso-region level, $meso(m)$.

Results are displayed in Table 10. In column (1), we regress the dependent variable on the average share of Pentecostals in 1991 without any other control. Although the coefficient on Pentecostals in 1991 appears to be positive and significant, as soon as we add state fixed-effects, and the $LandControls_m$ (column (2)), the correlation disappears. Result remains the same after controlling for the initial level of the municipal variables, X_m^{1991} (column (3)).

8 Conclusions

This paper has studied the effects of religious media on church affiliation and compliance with modes of economic and social behavior prescribed by the church. We concentrate on the Pentecostal movement drawing on the experience of Brazil and analyze the exposure to RecordTV, the second largest TV channel in the country, which started broadcasting religious content over the 1990s after its purchase by the Pentecostal Bishop Edir Macedo. Using technical characteristics of the transmitter and the ITM alogirthm (Olken 2009), we exploit differences in the timing of expansion of RecordTV signal into different areas to estimate the impact of RecordTV coverage on religious affiliation, fertility, female labor force participation, homicide rate, and voting. We find that, conditional on time-varying controls and time-invariant characteristics, the presence of the RecordTV signal leads to

significantly higher Pentecostal affiliation, higher fertility, lower participation of women to the labor force, lower homicide rate, and higher vote shares for Pentecostal candidates. Specifically, results show that an increase of one standard deviation in RecordTV signal strength leads to an increase of 0.9 p.p. in the share of Pentecostals, an increase of 0.47 p.p. in the fertility rate, a reduction of 0.1 p.p. in female labor force participation, a reduction in 1.5 homicides per 100,000 inhabitants, and an increase of 0.47 p.p. in the share of votes for Pentecostal candidates. The results hold under the use of an alternative IV strategy, exploiting the signal coming from the pre-purchase transmitters to predict the actual RecordTV signal. Our estimates imply that RecordTV convinced between 8.6% to 33.6% of its viewers to convert to the Pentecostal church, depending on the audience measure used.

While Wang (2020) shows that a charismatic religious leader can manipulate the media to influence voting behaviors, and Grosfeld, Madinier, Sakalli, and Zhuravskaya (2021) find that nonreligious media can significantly affect trust in religious institutions, our findings provide first systematic evidence that religious media can be successfully employed to spread religious messages which eventually influence the socio-economic behavior of believers. Future research is needed to understand which types of religious programs are effective in impacting specific behaviors, as well as how the effect of religious media integrates with other investment' and proselytizing strategies by the church.

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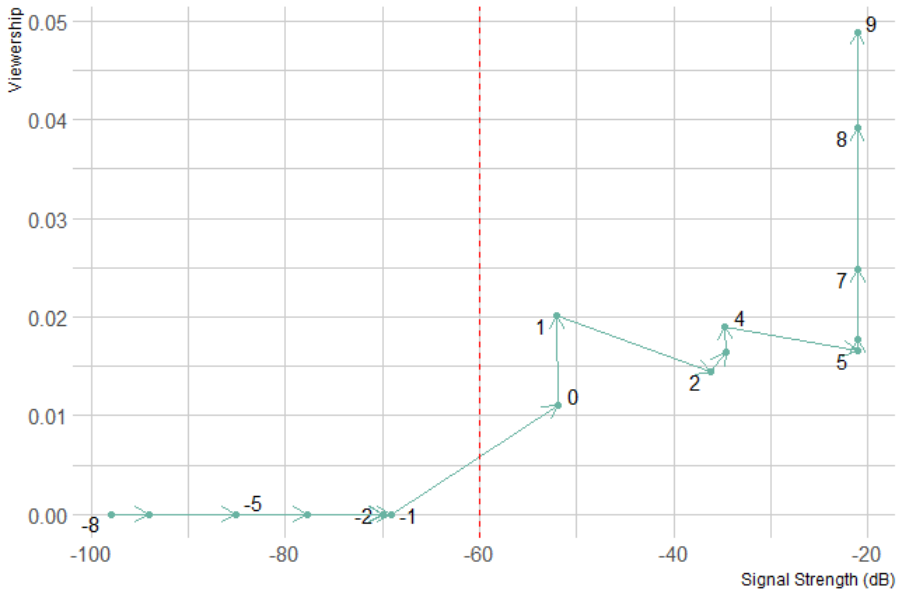
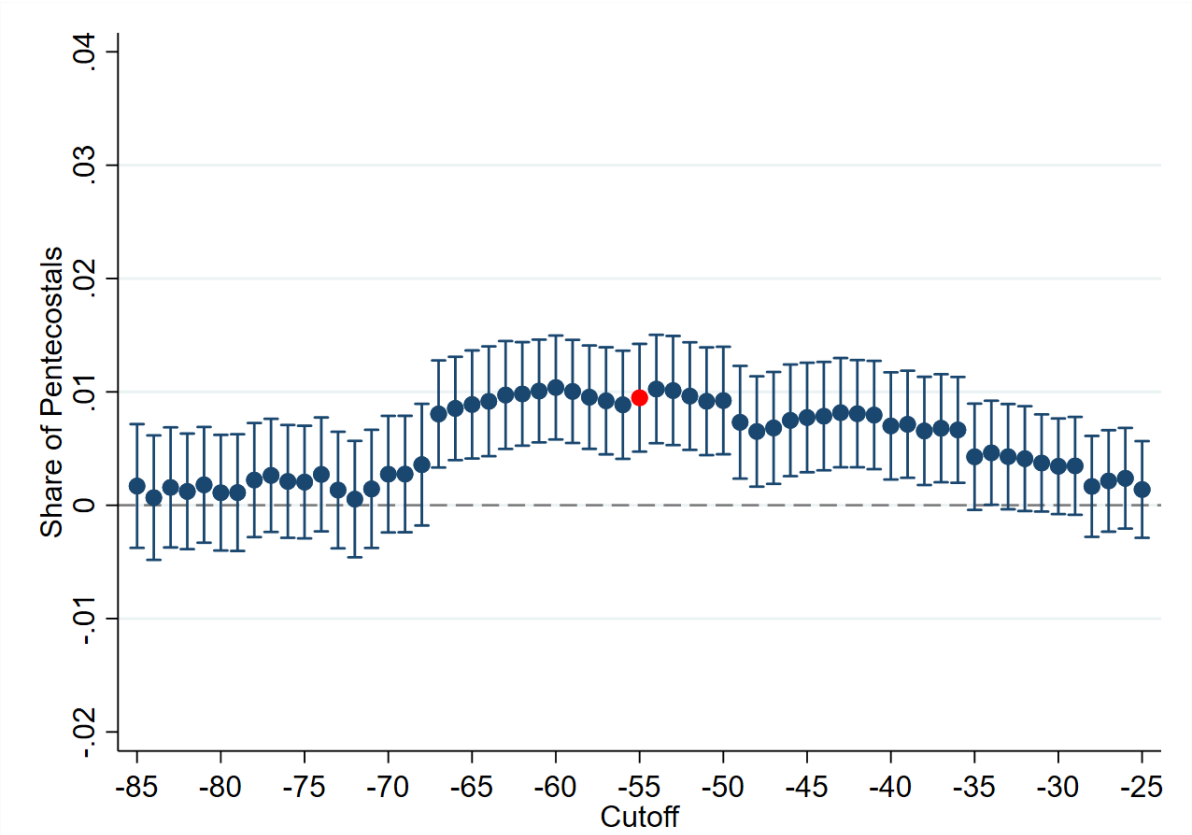
Tables and Figures

Figure 1: Signal Strength and RecordTV Viewership



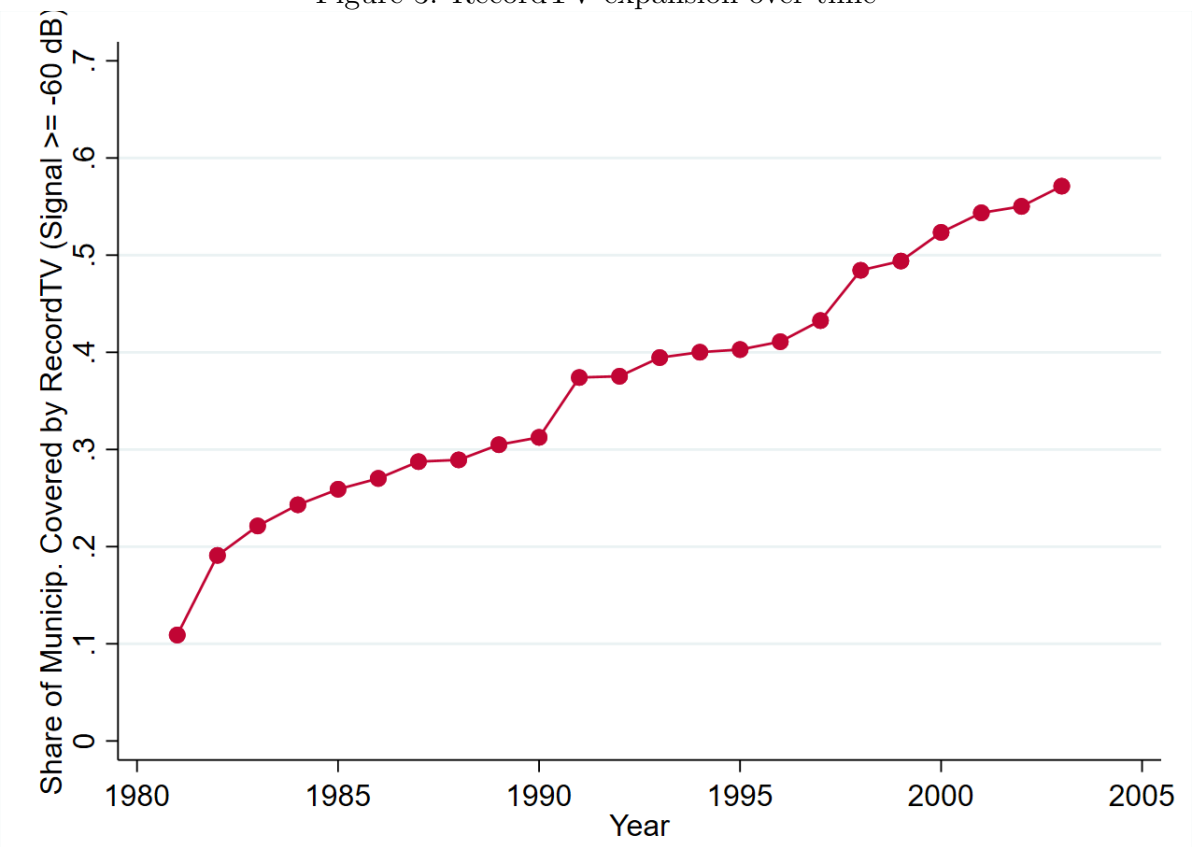
Notes: Data sources: IBOPE and ANATEL. The x-axis represents the maximum signal strength received by the municipality. The y-axis is RecordTV's daily average viewership. The dots represent the years before and after the event $t = 0$, which is the year when viewership becomes positive for the first time in the metropolitan region.

Figure 2: Sensitivity Analysis - Cutoff



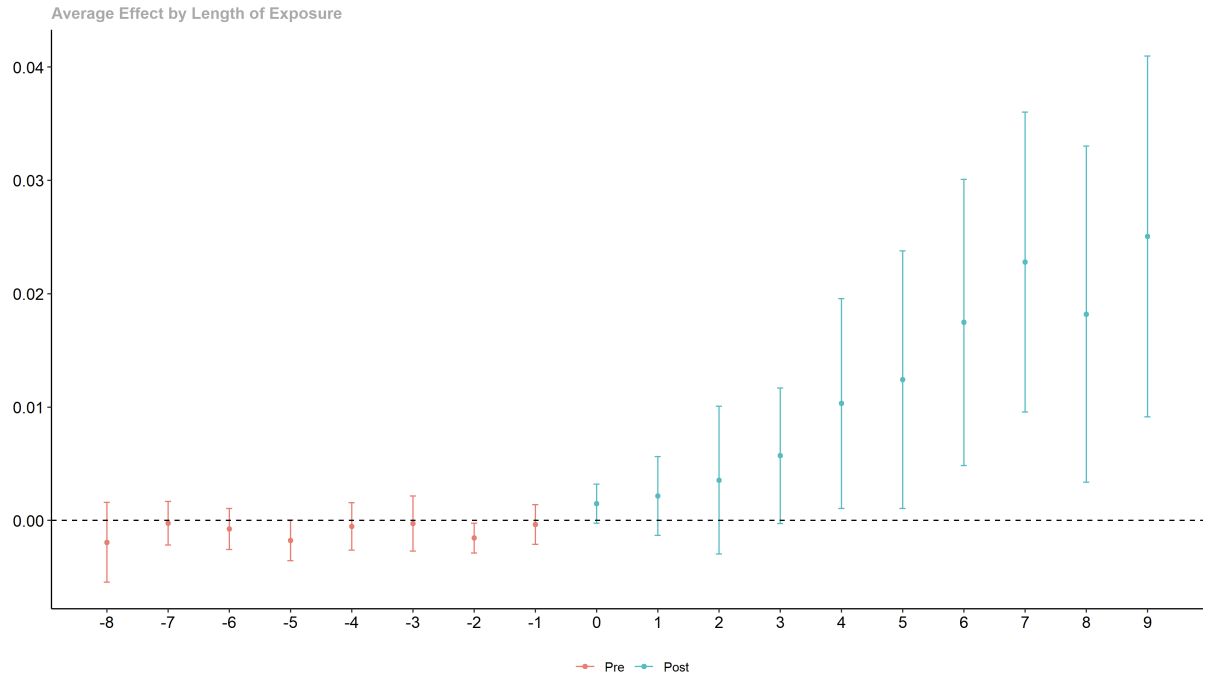
Notes: Data sources: 1991 and 2000 Census and ANATEL. Estimated coefficients at 95 percent confidence interval.

Figure 3: RecordTV expansion over time



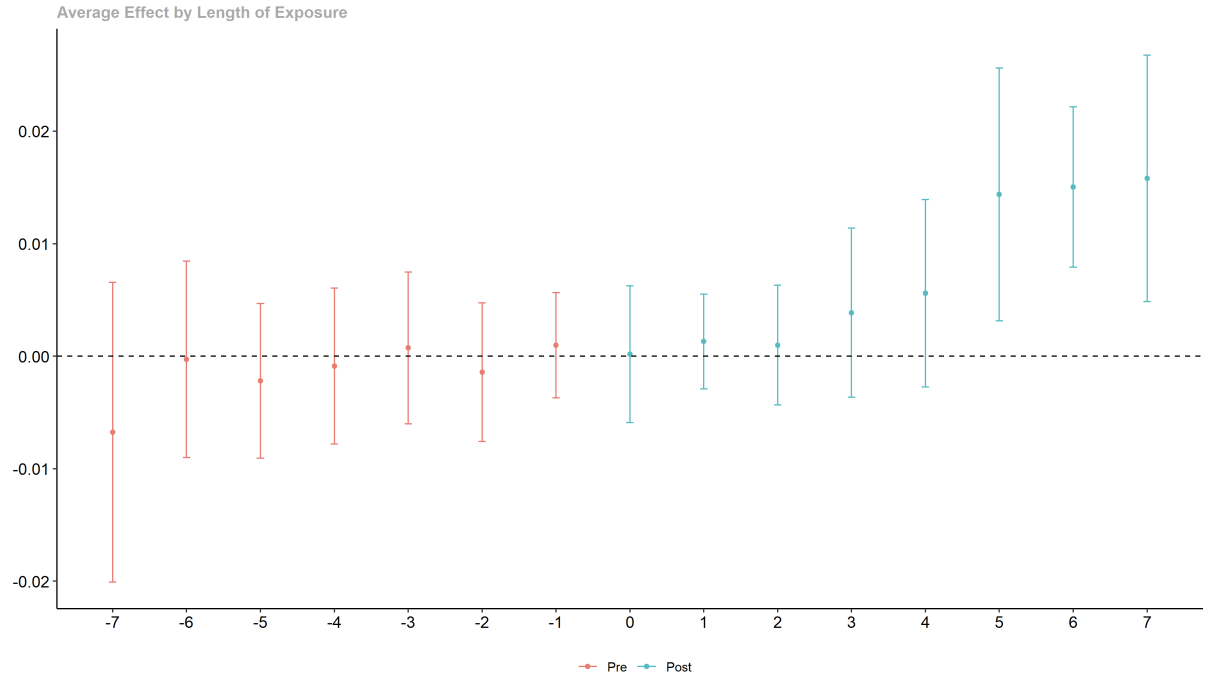
Notes: Data sources: ANATEL. The figure plots the share of municipalities that gets covered by RecordTV in a given year over the period 1980-2005. A municipality is considered covered if RecordTV signal strength goes above -60 dB in a given year.

Figure 4: Number of Churches per Capita



Notes: Data sources: Brazilian IRS and ANATEL.

Figure 5: Timing of Fertility Rise around Year of Coverage by RecordTV



Notes: Data sources: 2000 Census and ANATEL.

Table 1: Opinion about Sensitive Topics and Expenditure on Selected Goods by Religion

	Pentecostal		Catholic		P-C
Variable	Mean	SD	Mean	SD	p-value
Panel A: Opinion about Sensitive Topics					
Practice Religion Frequently (%)	77.2	42.2	42.1	49.4	0.00
Have Full Confidence in the Church (%)	62	48.8	55.8	49.7	0.26
God is Most Important in Life (%)	97.8	14.7	94.6	22.6	0.07
Think Religion is Important to Teach to Children (%)	79.3	40.7	65.7	47.5	0.00
Homosexuality Can Be Justified (%)	14.1	35	29	45.4	0.00
Abortion Can Be Justified (%)	4.35	20.5	9.33	29.1	0.04
Panel B: Individual Monthly Expenditure on Selected Goods as Share of Total Expenditure					
Alcohol (%)	.699	5	1.78	8.25	0.00
Tobacco (%)	1.4	7.68	4.08	13.7	0.00
Gambling (%)	.308	2.79	.999	6.21	0.00
Entretainment (%)	.208	2.23	.553	3.9	0.00
Transportation (%)	13.2	22.1	12.7	21.9	0.26
Food Outside the Home (%)	7.12	15.5	7.18	15.7	0.87

Notes: Data sources: 2002 Latin Barometer and 2002/2003 Brazilian Household Expenditure Survey (POF/IBGE).

Table 2: Exposure to RecordTV and Municipalities Characteristics (Balance Test)

	Mean	Univariate		State FE, MR FE, & Propagation controls	
	(SD)	Coefficient	R^2	Coefficient	R^2
	(1)	(2)	(3)	(4)	(5)
Population (log)	4.912	-0.046	0.000	-0.132	0.612
	(2.088)	(0.770)		(0.241)	
Populational Density	1.341	-0.282	0.003	-0.012	0.721
	(2.247)	(0.838)		(0.172)	
Share Urban Population	0.746	0.060	0.011	0.029	0.510
	(0.262)	(0.059)		(0.024)	
Share of White	0.516	0.147***	0.072	0.017	0.859
	(0.250)	(0.047)		(0.012)	
Share of Women	0.507	-0.001	0.000	0.000	0.146
	(0.029)	(0.004)		(0.002)	
Average Age (years)	26.015	1.924***	0.106	-0.125	0.587
	(2.686)	(0.627)		(0.305)	
Share Pop. High Education	0.122	0.027	0.025	-0.005	0.494
	(0.079)	(0.022)		(0.011)	
Share Pop. Medium Education	0.094	0.019	0.035	0.001	0.618
	(0.046)	(0.013)		(0.005)	
Income per capita	171.445	25.971	0.012	1.390	0.672
	(109.581)	(30.139)		(14.505)	
Agro Sector	0.247	-0.072	0.015	-0.034	0.528
	(0.268)	(0.057)		(0.026)	
Services Sector	0.532	0.037	0.007	0.002	0.450
	(0.198)	(0.051)		(0.019)	
Sanitation	0.328	0.156**	0.042	-0.038	0.723
	(0.346)	(0.076)		(0.039)	
Eletricity	0.850	0.104***	0.049	0.011	0.586
	(0.213)	(0.033)		(0.017)	
TV	0.774	0.083***	0.056	0.016	0.692
	(0.159)	(0.030)		(0.013)	
Refrigerator	0.744	0.104***	0.059	0.019	0.743
	(0.196)	(0.039)		(0.016)	
Car	0.218	0.071**	0.054	0.017	0.725
	(0.139)	(0.029)		(0.015)	

Notes: Data sources: 1991 Census and ANATEL. We define three categories of education: low, medium, and high, which refers to individuals with three or less years of education, 4 to 7 years of education, and more than 7 years of education, respectively. Standard errors clustered at the MMC level. Regressions weighted by the 1991 municipal population.

Table 3: Exposure to RecordTV (Pre-Trends)

Dep. Var. in 1991:	Pentecostal	LFP Women	LFP Men	Number of Children	Schooling Girls	Schooling Boys	Homicide Rate
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Coverage	.0023	-.0079	-.0025	.0047	.0059	.0036	.0051
	(.0017)	(.0079)	(.0041)	(.015)	(.0051)	(.0051)	(.014)
Number of Obs	3919	3918	3919	3912	3896	3902	3661
Number of Clusters	134	134	134	134	134	134	136
Propagation Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Munic. Controls Baseline	All	All	All	All	All	All	All
State and MR FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var. Baseline	.0291	.3109	.9034	1.8125	.0117	.0083	.1031

Notes: This table shows the effect of RecordTV's coverage in 1991 on the outcomes in 1990. Coverage is defined as signal strength above -55dB. The dependent variables are: (1) share of Pentecostals, (2) female labor force participation, (3) male labor force participation, (4) average number of children per 15-35 year-old woman, (5) share of 13-18 year-old girls that finished at least middle school, (6) share of 13-18 year-old boys that finished at least middle school, and (7) homicide rate per 100,000 population. Data sources: 1980 and 1991 Census and ANATEL. Municipal controls include all controls listed in Table 2. Regressions are weighted by the 1991 population. Standard errors clustered at the meso-region level. *p<0.10,**p<0.05,***p<0.01

Table 4: Effect of RecordTV Exposure on Religious Affiliation

	Dep. Var.: Pentecostal				
	(1)	(2)	(3)	(4)	(5)
Coverage	.0085	.029***	.03***	.013***	.0094***
	(.0091)	(.01)	(.0097)	(.0037)	(.0029)
Number of Obs	4491	4471	4471	4470	4470
Number of Clusters	137	137	137	136	136
Land Controls	No	Yes	Yes	Yes	Yes
Munic. Controls Baseline	No	No	Yes	Yes	Yes
Baseline	No	No	No	No	Yes
State and MR FE	No	No	No	Yes	Yes
Mean Dep. Var. Baseline	.03	.03	.03	.03	.03

Notes: This table shows the effect of RecordTV's coverage in 1990 on the share of Pentecostals in 2000. Data sources: 1991 and 2000 Census and ANATEL. Municipal controls include all controls listed in Table 2. Regressions are weighted by the 1991 population. Standard errors clustered at the MMC level. *p<0.10,**p<0.05,***p<0.01

Table 5: Effect of RecordTV Exposure on Religious Affiliation - Interpretation

	Share of Catholics	Share of Protestants	Conversion Rate	Presence of Pentecostal Church
	(1)	(2)	(3)	(4)
RecordTV Coverage	-.0077	.0017	.0058**	.038***
	(.0051)	(.0015)	(.0025)	(.012)
Number of Obs	4470	4470	4436	4470
Number of Clusters	136	136	136	136
Propagation Controls	Yes	Yes	Yes	Yes
Baseline	Yes	Yes	Yes	Yes
Munic. Controls Baseline	Yes	Yes	Yes	Yes
State and MR FE	Yes	Yes	Yes	Yes
Sample	All	All	All	All
Mean Dep. Var. Baseline	.83	.03	0	.78

Notes: This table shows the effect of RecordTV's coverage in 1990 on the outcomes in 2000. Coverage is defined as signal strength above -55dB. The dependent variables are: (1) share of Catholics, (2) share of Protestants, (3) conversion rate defined in section 5.1.1, and (4) presence of at least one Pentecostal church in the municipality. Municipal controls include all controls listed in Table 2. Regressions are weighted by the 1991 population. Standard errors clustered at the meso-region level. Data sources: 1980, 1991, and 2000 Census and ANATEL. The dependent variables are the shares of individuals belonging to the Catholic church (1), Protestant church (2), and Pentecostal church (3). Regressions are weighted by the 1991 municipal population. Data sources: 1991 and 2000 Census, SIM/SUS, and ANATEL.
*p<0.10,**p<0.05,***p<0.01.

Table 6: Effect of RecordTV Exposure on Behaviors

Dep. Var.:	LFP Women	LFP Men	Number of Children	Schooling Girls	Schooling Boys	Homicide Rate	Share Votes for Pentecostals
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Coverage 2000	-.0093*	-.0045	.027*	-.019***	-.0065	-.031	.0054*
	(.0048)	(.0066)	(.016)	(.0063)	(.0086)	(.026)	(.0032)
Number of Obs	4470	4470	4453	4442	4448	4470	4249
Number of Clusters	136	136	136	136	136	136	127
Propagation Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Munic. Controls Baseline	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline	Yes	Yes	Yes	Yes	Yes	Yes	No
State and MR FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var. Baseline	.38	.87	1.44	.23	.18	.2	-

Notes: This table shows the effect of RecordTV's coverage in 1990 on the outcomes in 2000. Dependent variable are defined as: (1) female labor for participation, (2) male labor for participation (3) the average number of children had by 15-35 years-old women had between 1991 and 2000, (4) share of 15-18 years-old girls that finished at least middle school, (5) share of 15-18 years-old girls that finished at least middle school, (6) homicides per 100,000 inhabitants, and (7) share of votes for Pentecostal candidates running for "Deputado Federal". Municipal controls include all controls listed in Table 2. Regressions are weighted by the 1991 population. Standard errors clustered at the MMC level. Data sources: 1991 and 2000 Census, TSE, SIM/SUS, and ANATEL. *p<0.10,**p<0.05,***p<0.01

Table 7: Effect of RecordTV and Globo Exposure on Religiosity and Behaviors

Dep. Var.:	Petecostal	LFP Women	LFP Men	Number of Children	Schooling Girls	Schooling Boys	Homicide Rate (log)	Share Votes for Pentecostals
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
RecordTV Coverage	.0086***	-.0097**	-.0048	.028*	-.018***	-.005	-.031	.0051
	(.0029)	(.0049)	(.0065)	(.016)	(.0064)	(.0083)	(.023)	(.0033)
Globo Coverage	.0026	.0011	.0074	-.017	-.0039	-.011*	-.043	1.2e-06
	(.0034)	(.0037)	(.0047)	(.013)	(.0053)	(.0064)	(.033)	(.0023)
Number of Obs	4470	4470	4470	4453	4442	4448	4470	4249
Number of Clusters	136	136	136	136	136	136	136	127
Land Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Munic. Controls Baseline	All	All	All	All	All	All	All	All
State and MR FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var. Baseline	.03	.38	.87	1.44	.23	.18	.2	-

Notes: This table shows the effect of RecordTV and Globo's coverage in 1990 on the outcomes in 2000. Dependent variable are defined as: (1) female labor for participation, (2) male labor for participation (3) the average number of children had by 15-35 years-old women had between 1991 and 2000, (4) share of 13-18 years-old girls that finished at least middle school, (5) share of 13-18 years-old boys that finished at least middle school, (6) log of homicides per capita, and (7) share of votes for Pentecostal candidates running for "Deputado Federal" in 2002. Municipal controls include all controls listed in Table 2. Regressions are weighted by the 1991 population. Standard errors clustered at the MMC level. Data sources: 1991 and 2000 Census, TSE, SIM/SUS, and ANATEL. *p<0.10,**p<0.05,***p<0.01

Table 8: Selection in RecordTV Access in 1991

	Coverage 1991		
	(1)	(2)	(3)
Pentecostal	1.209***	-0.213	0.246
	(0.465)	(0.314)	(0.244)
Distance			-0.002***
			(0.000)
Distance2			0.000***
			(0.000)
Area			0.000
			(0.000)
Area2			-0.000
			(0.000)
Height			-0.000**
			(0.000)
Height2			0.000***
			(0.000)
Ruggedness			-0.000
			(0.000)
Ruggedness2			0.000
			(0.000)
Distance to State's Capital			0.001***
			(0.000)
Distance to State's Capital2			-0.000***
			(0.000)
Catholic			0.137
			(0.101)
Population (log)			-0.028**
			(0.013)
Share Urban Population			-0.046
			(0.067)
Log Density			0.011
			(0.018)
Share of White			0.028
			(0.061)
Share of Women			-0.195*
			(0.113)
Average Age (years)			0.002
			(0.003)
Share Pop. High Education			-0.305
			(0.218)
Share Pop. Medium Education			0.152
			(0.217)
GDP per capita			-0.000
			(0.000)
Income per capita			-0.000
			(0.000)
Unemployment Rate			-0.001
			(0.002)
Agro Sector			0.017
			(0.083)
Services Sector			0.031
			(0.083)
Sanitation			0.073
			(0.068)
Water Supply			0.102
			(0.063)
Eletricity			-0.086
			(0.077)
Radio			-0.034
			(0.129)
TV			0.022
			(0.122)
Refrigerator			0.209
			(0.136)
Car			0.644***
			(0.175)
Number of Obs	4395	4394	4286
Number of Clusters	406	405	405
R2	.00832	.333	.514
State and MR FE	No	Yes	Yes

* Data sources: 1991 and 2000 Census and ANATEL. Standard errors clustered at the MMC level. *p<0.10,**p<0.05,***p<0.01

Table 9: Effect of RecordTV Exposure on Behaviors - Sample Restrictions

	(1) Pentecostal	(2) Female LFP	(3) Male LFP	(4) Gave Birth	(5) Girls' Schooling	(6) Boys' Schooling	(7) Homicide Rate	(8) Pentecostal Candidates
Benchmark	.0095***	-.0092*	-.0053	.027*	-.022***	-.0096	-.03	.0054*
	(.0029)	(.0048)	(.0063)	(.016)	(.0069)	(.0088)	(.025)	(.0032)
State Capitals	.0091***	-.011**	-.0071	.025	-.021***	-.0074	-.0087	.0055*
	(.0029)	(.0047)	(.0063)	(.016)	(.0072)	(.0093)	(.023)	(.003)
State Capitals and Pop. > 1000K	.0089***	-.011**	-.0072	.026	-.021***	-.0072	-.0079	.006**
	(.003)	(.0047)	(.0063)	(.016)	(.0072)	(.0093)	(.023)	(.0028)
State Capitals and Pop. > 500K	.0087***	-.0099**	-.0057	.028*	-.021***	-.0061	-.013	.0049*
	(.003)	(.0048)	(.0063)	(.016)	(.007)	(.0091)	(.022)	(.0026)
State Capitals and Pop. > 250K	.006**	-.0078	-.01	.029	-.023***	-.0026	-.0032	.0021
	(.0027)	(.0052)	(.0064)	(.018)	(.0074)	(.0083)	(.017)	(.0028)
State Capitals and Pop. > 100K	.0035	-.0061	-.0061	.038**	-.025***	-.0053	-.0017	.0022
	(.0027)	(.0058)	(.0069)	(.019)	(.0074)	(.0088)	(.011)	(.0019)
Transmitter	.0071**	-.0083	-.0044	.014	-.022***	-.0091	-.028	.007**
	(.0029)	(.0051)	(.0063)	(.017)	(.0074)	(.0095)	(.022)	(.0034)
Transmitter and Distance > 10km	.0077***	-.0074	-.0053	.01	-.02***	-.0096	-.029	.0077**
	(.0027)	(.005)	(.0064)	(.018)	(.0074)	(.0095)	(.023)	(.0035)
Transmitter and Distance > 20km	.0071**	-.0051	-.0069	.0049	-.019**	-.0094	-.027	.0077**
	(.0029)	(.005)	(.0065)	(.018)	(.008)	(.0095)	(.023)	(.0037)
Transmitter and Distance > 30km	.0068**	-.0041	-.007	.012	-.019**	-.012	-.036*	.0083**
	(.003)	(.0057)	(.0073)	(.02)	(.0079)	(.0098)	(.02)	(.0033)

Notes: Data sources: 1991 and 2000 Census and ANATEL. *p<0.10,**p<0.05,***p<0.01

Table 10: Selection in RecordTV Entry

	(1) Signal 2000	(2) Signal 2000	(3) Signal 2000
Averages in 1991:			
Share of Pentecostals	1.615***	-0.180	0.266
	(0.386)	(0.383)	(0.279)
Signal Free Space1			0.170***
			(0.016)
Signal			0.563***
			(0.025)
Age (years)			-0.001
			(0.003)
Share of Whites			0.322***
			(0.054)
Wealth (Index)			0.018
			(0.022)
Share of People with Low Education			0.166
			(0.240)
Share of People with Medium Education			0.295
			(0.372)
Share of Women			0.176
			(0.144)
Share of Catholics			-0.167
			(0.105)
Log Population			0.053***
			(0.010)
Area (km)			-0.000
			(0.000)
Area (km) squared			0.000
			(0.000)
Height (m)			-0.001***
			(0.000)
Height (m) squared			0.000***
			(0.000)
Ruggedness			0.000
			(0.000)
Ruggedness (squared)			-0.000
			(0.000)
Number of Obs	4491	4491	4471
Number of Clusters	4491	4491	4471
R2	.00378	.313	.693
State FE	No	Yes	Yes

* Data sources: 1991 and 2000 Census and ANATEL. The dependent variable is the maximum standardized signal strength received by the municipality in 2000. Standard errors are heteroskedasticity-consistent. *p<0.10,**p<0.05,***p<0.01

Table 11: Viewership

	(1) Measure 1	(2) Measure 2
Coverage	.4	.087*
	(.22)	(.039)
Number of Obs	10	10

Notes: Data sources: IBOPE and ANATEL. *p<0.10,**p<0.05,***p<0.01

Appendix A

Figure A1: Signal Strength across Brazilian Municipalities

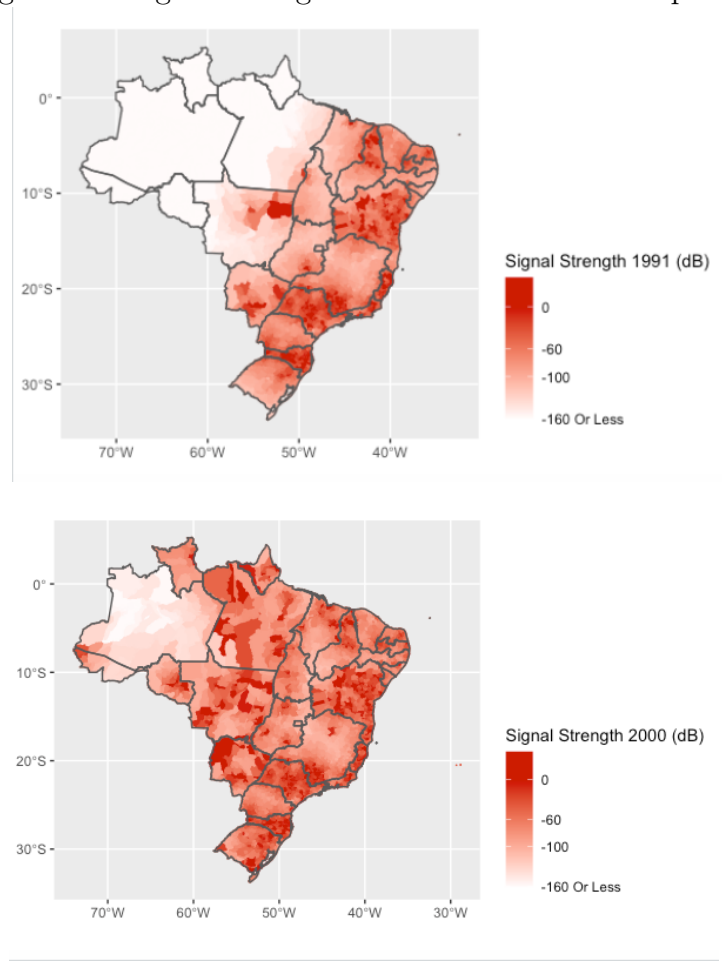


Figure A2: Share of Pentecostals across Brazilian Municipalities

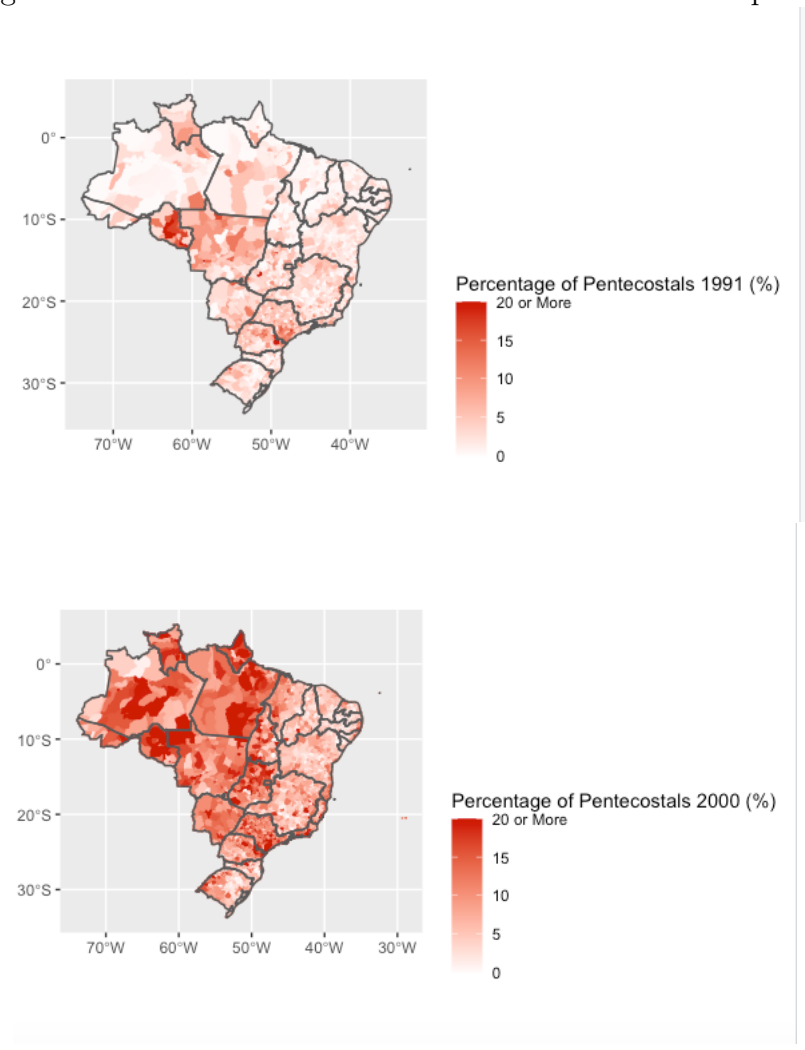
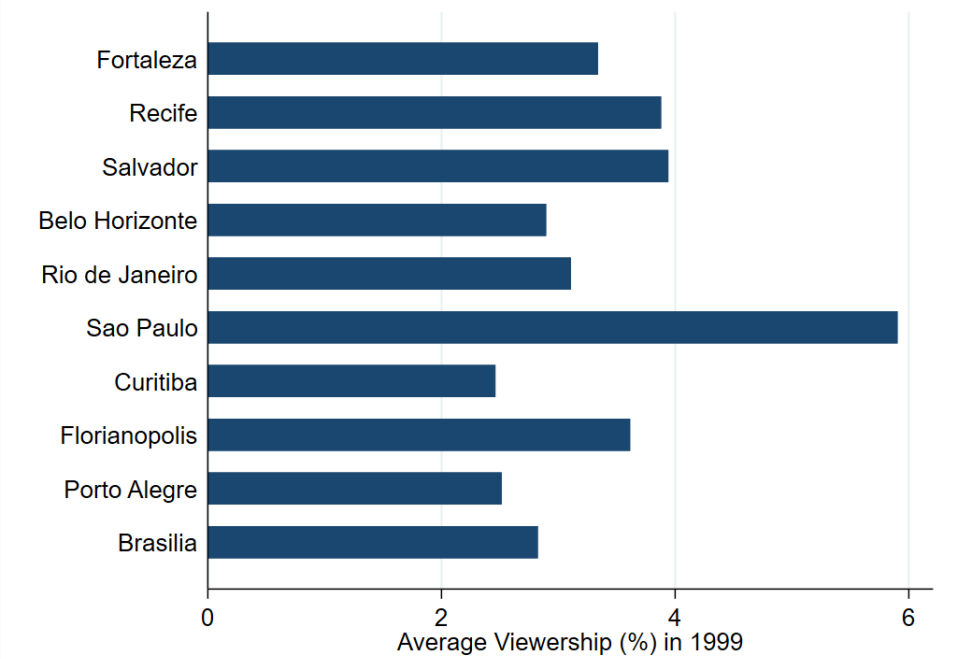
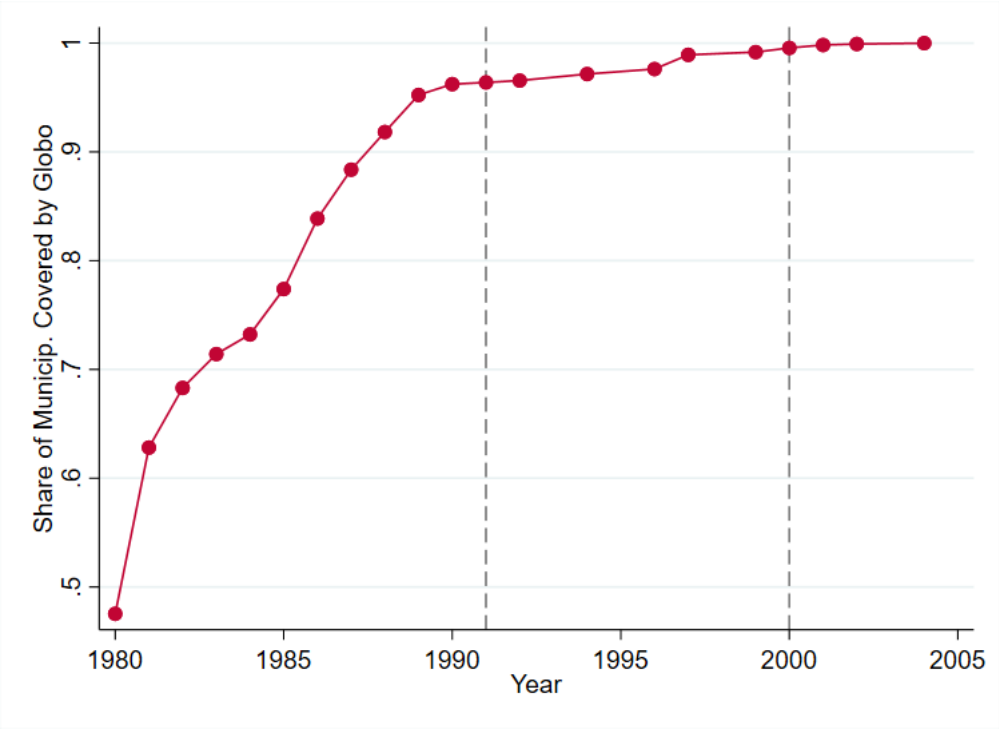


Figure A3: Average (%) RecordTV Viewership in 10 Metropolitan Regions in 1999



Notes: Data source: IBOPE. This graph shows the average viewership of RecordTV in 10 metropolitan areas where the data was available.

Figure A4: Expansion of TV Globo across Brazilian Municipalities



A.1 TV Shows

25th Hour/Speak that I will listen (*25a Hora/Fala que eu te escuto*): "25th Hour" was a live show hosted by Pastors that was launched in 1992. Its content was strictly religious. At the end of the show, a glass of sanctified water was used to bless the audience. In 1998, the show was replaced by "Speak that I will listen", which followed a similar format although the content was expanded to topics other than religion. It was one of the most popular night shows on the Brazilian TV.

Misteries (*Mistérios*): [...] The show had an section called "Exorcism Sections", where Pastors associated diseases and misconducts to the action of devil spirits of Afro-Brazilian religions. RecordTV faced a law suit because of this show.

Nosso Tempo: This show follows the true cases of people who overcame their problems thanks to their meeting with faith and succeed in changing their life.

O despertar da fé: at the beginning, this program was personally conducted by Edir Macedo. The logo used was that of two hands joined in a prayer position, gently cut by sunlight, and rigorously selected testimonies came to speak about their religious experiences.

In 1997, RecordTV started producing short soap operas with religious and moralizing content. Here, we briefly describe some of these shows.

The Devil's Daughter (*A filha do Demonio*): Ana's soul was sold to the Devil by her father, a poor man, for US$100,000. While her father lived a frivolous life, Ana grew up angry and bitter because of the devilish pact. This rage turned her into a rebellious and mean adult. When the father decides to confess her about the pact, she gets a chance of changing her destiny.

The Eye of the Earth (*O olho da Terra*): Sara was a spiteful woman that used witchcraft to attack the wife of the man she loved. Her misdeeds ended when an evangelizing man arrived to the town. The show had the participation of a famous Brazilian gospel singer.

Soul of Stone (*Alma de Pedra*): Leandro was a bitter and disturbed man. His life transformed when he decided to convert to the UCKG. This story was based on testimonies of the UCKG's believers.

Elias' Challenge (*O desafio de Elias*): this historical fiction gravitates around the struggle of Elijah, an ordinary man who received the divine call, to make the Word of the God of Israel prevail and to convince the Jewish people of their sins. Opposed by the proud King Ahab and his wife, the evil Jezebel, he fought to prove that the Lord is more powerful and stronger than the false god Baal.

A História de Ester: Ester, a Jewish girl, decided to marry a pagan king and became queen to protect the Jews from extermination, while hiding her religious identity.