

# Media and Polarization

## Evidence from the Introduction of Broadcast TV in the United States<sup>\*</sup>

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### Abstract

This paper sheds light on the links between media and political polarization by looking at the introduction of broadcast TV in the US. We provide causal evidence that broadcast TV decreased the ideological extremism of US representatives. We then show that exposure to radio was associated with decreased polarization. We interpret this result using a simple framework that identifies two channels linking media environment to politicians' incentives to polarize. First, the ideology effect: changes in the media environment may affect the distribution of citizens' ideological views, with politicians moving their positions accordingly. Second, the motivation effect: the media may affect citizens' political motivation, changing the ideological composition of the electorate and thereby impacting elite polarization while mass polarization is unchanged. The evidence on polarization and turnout is consistent with a prevalence of the ideology effect in the case of TV, as both of them decreased. Increased turnout associated with radio exposure is in turn consistent with a role for the motivation effect.

*Keywords:* Media; Political Polarization; Turnout; Ideology; TV; Radio.

*JEL Classification:* D72, L82, O33

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# 1 Introduction

Polarization has been one of the dominant themes in US politics in recent years. The contentious debates and votes on health care reform and the debt ceiling in the 2010-2012 Congress vividly illustrate the escalating partisan divide. This rise in partisan polarization, starting in the 1970s, has been widely discussed by commentators (Dionne 2004, Krugman 2004, *inter alia*), and well-documented by scholars (e.g. Sinclair 2006, McCarty et al 2006), who have also noted that it followed a substantial drop in the preceding half-century. These movements are important because polarization has substantive policy consequences. Polarization is associated with increased levels of political gridlock (Binder 1999, Jones 2001), implying much reduced rates of policy innovation and a decreased ability to adapt to changes in economic, social, or demographic circumstances (McCarty 2007).<sup>1</sup> Such concerns are not limited to the US or developed democracies: polarization in developing countries is often linked to social and political unrest, with implications for economic development (e.g. Huntington 1968, Keefer and Knack 2002, Montalvo and Reynal-Querol 2005, Esteban and Ray 2011).<sup>2</sup>

What explains these movements in polarization? An element that is often mentioned as an important driver and propagator is the role of a changing media landscape. There is growing evidence to support that the media affect individuals' views and political behavior, and it is only natural to wonder whether this might translate into an impact on political polarization.<sup>3</sup> The nature, extent, and direction of that impact is not clear, however. A longstanding view on “mainstreaming” has held that mass media have tended to induce conformity and lower polarization. As put by Gerbner et al (1980, p. 19-20) when analyzing the role of television, they can “contribute to the cultivation of common perspectives. In particular, heavy viewing may serve to cultivate beliefs of otherwise disparate and divergent groups toward a more homogeneous ‘mainstream’ view.” In the opposite direction, it is now often argued that new media such as cable TV or the Internet have increased polarization by enabling individuals to select

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<sup>1</sup>For a relatively contrarian view on the link between polarization and gridlock, at least when it comes to the use of the filibuster in the US Senate, see Koger (2010).

<sup>2</sup>Interestingly, for some, less polarization could have negative consequences. The drop in polarization in the US in the mid-century highlighted that a depolarized polity might lead to demobilization in the face of a lack of distinct choices (APSA, 1950).

<sup>3</sup>Many other hypotheses to explain increased polarization have been raised and confronted, ranging from changes in political or electoral institutions to big societal shifts such as inequality and immigration patterns. All of these may have played important roles, as documented by McCarty et al (2006), and we view the role of the media as complementary to them: more often than not the media can amplify changes originated elsewhere. By the same token, we do not imply or require that they propagate specific views with a deliberate political agenda.

outlets that conform to their prior ideologies as in an “echo chamber” (Bishop 2008, Sunstein 2009).<sup>4</sup>

This paper seeks to shed light on the effects of the media landscape on political polarization by looking back to the episode of the introduction of broadcast TV in the US, in the 1940s and 1950s, and complementing that with a look at the introduction of radio, in the 1920s and 1930s. These constitute a particularly propitious context to study those effects, since they represented massive changes in media technology and consumption patterns, and coincided with a period over which there was a substantial drop in measured partisan polarization (McCarty et al 2006).

We find robust evidence of an effect of the introduction of broadcast TV in decreasing the ideological polarization of the US Congress, as captured by the DW Nominate scores of the members of the House. More precisely, places where TV was introduced earlier displayed a decrease in different measures of the extremism of their representatives, relative to latecoming places. In order to identify a causal effect, we use Gentzkow’s (2006) strategy based on a fixed-effects specification that relies on the rapid introduction of TV, and makes use of the exogenous variation introduced by shocks to the timing of its expansion and by the technologically determined reach of TV signals. The results we find suggest that TV operated as an important moderating force, bringing members of Congress toward the political center. Our preferred estimate of the quantitative effect of TV corresponds to a sizable decrease of one standard deviation in polarization over the span of one decade.

We then consider additional evidence by looking at the diffusion of radio. Using a novel data set on the location and network affiliation of radio stations in the US in the 1930s and 1940s, we find a robust negative correlation between radio exposure and our measures of polarization. In contrast with the case of TV, where we find that turnout in congressional elections decreased (as in Gentzkow 2006), radio was associated with an increase in turnout (as in Strömberg 2004).

In order to rationalize and interpret these results, we present a simple theoretical framework that could apply to any change in media technology. It relies on one basic assumption that is well-supported

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<sup>4</sup>This view is well illustrated by Pres. Barack Obama’s (2010) remarks to the University of Michigan graduating class: “Today’s 24/7 echo-chamber amplifies the most inflammatory soundbites louder and faster than ever before. And it’s also, however, given us unprecedented choice. Whereas most Americans used to get their news from the same three networks over dinner, or a few influential papers on Sunday morning, we now have the option to get our information from any number of blogs or websites or cable news shows. (...) If we choose only to expose ourselves to opinions and viewpoints that are in line with our own, studies suggest that we become more polarized (...) That will only reinforce and even deepen the political divides in this country.”

by evidence: exposure to media content can affect individual political attitudes.<sup>5</sup> We distinguish between two types of attitudes, namely *political motivation* and *ideology*. We think of ideology as a “horizontal” dimension that could be summarized by a liberal-conservative or left-right scale. By political motivation, in contrast, we attempt to capture a “vertical” dimension that is orthogonal to those ideological considerations. This could encompass things such as civic duty, or political information and knowledge. These two types of attitudes give rise to two separate channels through which changes in the media environment affect the polarization of politicians: the *ideology effect* and the *motivation effect*.

The *ideology effect* is straightforward: as suggested by the “echo chamber” argument, changes in media environment can contribute to polarize or depolarize the ideological views of citizens who are exposed to it. This reflects a complementarity between changes in popular ideologies and the positions taken by candidates or parties: if changes in media environment lead to a reduction in mass polarization – a compression of the distribution of citizens’ ideologies – parties have an electoral incentive to move towards the center. This translates into a decrease in the polarization of party positions.

The *motivation effect* gets at the impact of changes in political motivation on the incentives of politicians to polarize. A change in the media environment can strongly impact political motivation. For instance, it can raise or decrease an individual’s exposure to political content, affecting her level of political information and engagement with politics, and hence her inclination to turn out in elections. Crucially, to the extent that partisanship and the intensity of political preferences are positively associated with that inclination, a broad increase in motivation will change the ideological composition of the electorate, bringing more moderates into the voting pool. This affects the electoral incentives faced by politicians and can push them towards more centrist positions, lowering polarization.

Our framework suggests that TV and radio may have decreased polarization both because they affected the level of political motivation of its viewers and/or because they influenced their ideological views. At the same time, our theory gives us a strategy to distinguish between these different channels, as they have different implications on turnout. In the case of the motivation effect, an increase in political motivation is associated with an inflow of new voters that are relatively more moderate than

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<sup>5</sup>A body of experimental or quasi-experimental studies, in recent years and decades, has found solid support for the impact of different type of media on political evaluation (Iyengar et al 1984, Iyengar and Kinder, 1987), participation (Gerber et al, 2009), attitudes toward ideologically charged issues such as fertility decisions (La Ferrara et al, 2012), women status (Jensen and Oster, 2009) or civil liberties (Nelson et al., 1997), to mention a few.

the original pool of voters. In this case, a drop in polarization is linked to an increase in turnout. On the other hand, if someone is more likely to vote when the candidates' policies are more dissimilar, lower polarization will tend to reduce turnout. In short, a given drop in polarization will be accompanied by a reduction in turnout when it is driven by the ideology effect.

The evidence on turnout suggests that the decrease in polarization that we document following the introduction of TV is consistent with the ideology effect. This is in line with the evidence that the content of broadcast TV was mostly uniform across different places and stations, and generally aimed at the center of the ideological spectrum. While TV may have affected political motivation regarding congressional elections – positively, as argued by Prior (2007), or negatively, as argued by Gentzkow (2006) – an explanation for its effect on polarization that emphasizes those movements cannot accommodate the simultaneous drop in polarization and turnout that we document. In the case of radio, the finding of increased turnout suggests that the lowering of polarization associated to the introduction of radio is consistent with the prevalence of the motivation effect. That said, we cannot rule out alternative explanations for our central empirical results, and we discuss some of those in section 3.

Our paper relates directly to the growing literature in political science and economics that has examined the interaction between media and politics. In particular, we relate to the body of work substantiating the widespread perception that the introduction of different media technologies has had significant impact on political outcomes such as turnout and partisan voting (e.g. Bartels 1993, Della Vigna and Kaplan 2007, Gentzkow 2006, Gentzkow and Shapiro 2004, Gentzkow et al. 2009, Gerber et al. 2009, Strömberg 2004).

On the specific relation between media and polarization, we do not know of previous work that identifies a causal, statistically significant effect.<sup>6</sup> This reinforces the view that technological and regulatory changes in media markets can have deep effects on political outcomes. In addition, we provide a theoretical framework that could be applied to rationalize the impact of the introduction of other media on the political equilibrium (e.g. cable TV, the Internet, social media).<sup>7</sup>

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<sup>6</sup>Prior (2007) suggests that the introduction of broadcast TV in the US led to depolarization, providing correlational evidence using survey data. He argues that different media technologies differ in how efficient they are at segmenting entertainment and information, and less efficient media, offering a smaller degree of choice between different types of content, could lead politically unmotivated consumers to be passively exposed to political content. This mechanism can be thought of as a special case of the motivation effect we formalize.

<sup>7</sup>Stone (2012) studies how the media environment can directly affect the polarization of politicians, without mediation from the behavior of voters.

The remainder of the paper is as follows: Section 2 presents the main results from the evidence on the introduction of broadcast TV, and the additional evidence from the case of radio. Section 3 then provides an interpretation, by first introducing a simple framework to analyze the links between media environment and polarization, and then revisiting the evidence. Section 4 concludes.

## 2 TV and Polarization: Empirical Evidence

The introduction of broadcast TV in the US, over the 1940s and 1950s, is a promising episode for assessing the impact of changes in the media environment on polarization. Television was adopted very fast and very broadly – the share of US households with TV sets went from 0.02% in 1946, to 9% in 1950, and had reached 87% by 1960 (Edgerton 2009, p.103; Television Bureau of Advertising 2011, p.2). Its effect on general attitudes and beliefs has been well-documented (e.g. Edgerton 2009), with natural ideological and political implications (Iyengar and Kinder 1987, Bartels 1993, Gentzkow 2006, Prior 2007). At the same time, the middle third of the 20th century in the US was characterized by a remarkable decrease in party polarization (McCarty et al. 2006). While many societal and institutional changes beyond the introduction of media technologies lie behind this trajectory, the variation entailed by the combination of rapid and important change in media environments, plus substantial changes in polarization, yields a context where we may be able to identify effects that are quantitatively important.

### 2.1 Empirical Strategy and Data

Our goal is to identify whether the level of polarization displayed by politicians was affected by the exposure of their constituents to TV. The fast adoption of broadcast TV means that there was substantial variation over a short period of time. It was also the case that there was substantial variation across different places in terms of the timing of introduction of and the exposure to the new medium. This suggests a panel data strategy that takes advantage of those two dimensions to remove the bias introduced by the fact that adoption was clearly correlated with demographic characteristics of each location. However, a simple panel data approach can only offer a partial response to that bias, as it can only remove the time- or location-invariant unobserved components.

In order to strengthen causal identification, we adopt the two-pronged strategy introduced by

Gentzkow (2006), in his study of the effect of TV on voter turnout. It first relies on the fact that the timing of introduction of TV in different localities was affected by exogenous events that delayed introduction in markets that would have otherwise gotten TV earlier than they did – namely World War II and a later freeze imposed by the Federal Communications Commission (FCC) on new operation licenses, between 1948 and 1953. In 1942, after the entry of the US into WWII, the government banned the construction of new TV stations, as part of the war rationing effort. After TV had rapidly expanded in the immediate aftermath of the war, the FCC decided that the allocation of the spectrum was leading to excessive interference, and in late 1948 it banned new licenses until that allocation was redesigned. The process was completed only in April 1952, further delaying the geographic expansion of the reach of TV signals. Gentzkow (2006) shows that it clearly affected the timing of the introduction of TV, which was concentrated in three spurts: areas that got access prior to the war freeze (1940-42), immediately after the war and before the freeze (especially in 1948 and 1949), and after the freeze (1953 and 1954). This essentially idiosyncratic component to timing allows for cleaner identification.

The introduction of TV was indeed affected, however, by demographic characteristics – especially population density and income, with richer and more populated areas being reached first. The second prong of the identification strategy is thus to control for those demographics, as a way of further removing any spurious correlation, by exploiting the fact that the signal from any given TV station reaches a demographically heterogeneous set of counties, as captured by the so-called Designated Market Areas (DMAs). In a nutshell, suppose that TV was introduced into a given DMA because of demographic characteristics of a metropolitan area located in that DMA – characteristics that may affect the path of polarization due to reasons unrelated to the media (e.g. population trends), thereby introducing bias. It was still the case that other places within the same DMA, which did not share those characteristics, were also exposed to TV – in other words, due to reasons that are exogenous from those other places’ perspective. We can thus compare them to similar locations that just happened not to be in that DMA.

The strategy is to use that variation in two complementary ways. First, we control for the interaction between key demographic variables that did affect the timing of introduction of TV, namely income and the log of population, and a fourth-order polynomial in time. This lets us control, in a very general way, for the evolution over time of these variables and thus focus on the residual variation, which is essentially idiosyncratic: as shown by Gentzkow (2006), the timing of introduction of TV was orthogonal to the

observable variables, once we control for population and income and regional dummies. We will argue below that this variation is also orthogonal to political characteristics, and in particular to polarization. We will nevertheless include as a control an interaction of a fourth-order polynomial in time and initial polarization, as of 1940, to allow for a possible differential impact of the latter over time. Second, similar to a matching strategy, we split the sample into terciles according to a number of observable dimensions, and compare the estimated effects of TV exposure within the more homogeneous sample provided by each specific tercile.

This strategy translates into the following regression specification:

$$Y_{it} = \alpha_i + \delta_{rt} + \gamma TV_{it} + \beta X_{it} + \epsilon_{it} \quad (1)$$

where  $i$  refers to location,  $t$  to years and  $r$  to census region. Note that we include location fixed effects and also region-year fixed effects, which let us control for unobservable time effects that we allow to vary by region. Our unit of analysis, in terms of location, will be counties, since this is the level at which the TV and demographic information are available.  $Y_{it}$  is the outcome variable, and  $X_{it}$  stands for a set of control variables, which includes in particular the aforementioned time-demographics and time-polarization interactions.<sup>8</sup>

In order to model the effect of TV,  $TV_{it}$ , we again follow Gentzkow (2006) in looking at the number of years since the introduction of TV in the county (*“years of TV”*).<sup>9</sup> This is the measure that encapsulates the idiosyncratic variation introduced by the exogenous freezes, and it does so less crudely than a simple dummy variable, since we should expect any effect to be felt over time. Finally, we restrict our attention to the sample between 1940 and 1966, to focus on the period over which TV was being introduced.<sup>10</sup>

We must also define our main variable of interest: polarization. More broadly, we are interested in looking at the effect of TV on the ideological positions of politicians, and on how extreme and polarized they are. For that we use the DW Nominate scores for US House members (available at [voteview.com](http://voteview.com)).<sup>11</sup>

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<sup>8</sup>We use 1960 as our benchmark year for the demographics.

<sup>9</sup>We set 1946 as year zero for all counties where TV was introduced before the end of World War II, since the penetration of TV was essentially negligible until then.

<sup>10</sup>We leave out of the sample the small number of counties where TV was introduced after 1960. These were very small DMAs and had by 1960 extensive television ownership, suggesting they could be receiving television signals from neighboring markets. The results are robust to their inclusion.

<sup>11</sup>The Nominate methodology was introduced by Poole and Rosenthal (e.g. Poole and Rosenthal 1985), and the DW-Nominate variation by McCarty et al (1997). We actually look at the first coordinate of DW Nominate, usually interpreted



This is a well-established measure for ideological positions that is comparable across individuals and over time. However, it is available at the congressional district level, while we want variation at the county level to match the data on the introduction of TV, as specified above. We do this conversion by using the classification provided by ICPSR (study #8611). If one district comprises more than one county, which is typically the case, we attribute the Nominat score of the district’s representative to all of the counties. Due to their geographic proximity, those counties will most often be part of the same TV market – and will thus share the same date of TV introduction – but not always. In any event, we will cluster the standard errors at the level of the congressional district – by decade, since districts are redrawn based on every new Census. We also leave aside counties that are split over more than one district.<sup>12</sup> In the end, we are left with a panel with one measure of ideological position per county per congress, i.e. two-year period.<sup>13</sup> Our results are nevertheless essentially unaltered if we take congressional districts as our unit of observation, averaging our demographic variables within each district using county population as our weighting variable (available upon request).

More specifically, with this measure of ideological position we construct three distinct measures to capture, in different ways, the relative extremism and polarization of US representatives. Two of these measures are relative: the (absolute value of the) difference between a county’s score and the average score of all counties in that year, and the (absolute value of the) difference with respect to the median score of all counties. These measures of “*average polarization*” and “*median polarization*” capture the extent to which a county’s representative’s preferences depart from the national center, and will be the main outcome variables of interest in our analysis. The third is a non-relative measure, which compares the ideological score to a time-invariant “center”, namely the standard DW Nominat benchmark of zero. We will refer to this, the absolute value of the county’s score, as “*absolute polarization*”.

Last but not least, in addition to these main variables, we will also look at voter turnout (in

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as a conventional left-right ideological spectrum, as distinct from the second dimension that in the US case used to capture positions with respect to racial issues. This might be relevant for the period we are looking at, which mostly precedes the Southern realignment. We will discuss how the presence or absence of the South in the sample affects our results and their interpretation.

<sup>12</sup>We have also checked our results including those counties, for which case we take the relatively coarse approach of taking the Nominat score of a given county to be the simple average of all the representatives associated with it. (Ideally, we would like to weigh that average by the share of the county’s population that belongs to each district, but we do not have that information.) The results are robust, and available upon request.

<sup>13</sup>Some districts do not have Nominat scores for all years in the original DW Nominat data set, so the panel is not fully balanced.

congressional elections), from the county-level data compiled by ICPSR (again from study #8611). TV has been found elsewhere to have decreased congressional turnout (Gentzkow 2006), and we will see that this evidence will be helpful in interpreting our evidence on polarization.

Having defined our main variables of interest, we can now check whether the key variation we use – differences in the timing of TV introduction across space, controlling for demographics – is uncorrelated with political characteristics. This is important for validating our identification strategy in this context. We start by looking at a number of variables: the party of the winning candidate in local congressional elections (a dummy equal to 1 for Democrats), the Democratic party’s share of the two-party vote in congressional and presidential elections, the competitiveness (the absolute value of the difference between votes for Democratic and Republican candidates), and the level of turnout in congressional elections, all as measured before the introduction of TV. In fact, if we exclude the South, which at the time was effectively a one-party system, we see no correlation between these variables (in the 1938 elections) and the year of introduction of TV in a given county. (The results are shown for convenience in Appendix Table 1.) In other words, places that got TV early were not systematically more nor less likely to have competitive elections, vote Democratic, or have greater turnout than those counties that got TV relatively late.

Most importantly, the introduction of TV was also uncorrelated with initial levels of polarization. To check for that, we regress the year when TV was first introduced in a given DMA on the log of median income and of population, computed as (unweighted) averages at the DMA level as of 1939, and on the (unweighted) mean polarization (average, median, and absolute) at the DMA level, as measured for the Congress elected in 1938. The results from these regressions, which we display for convenience in Appendix Table 2, show that the variation in the timing of introduction of TV, after controlling for the key demographics, is essentially orthogonal to political polarization: the t-statistics are never above 0.6 in absolute value. Simply put, there is no evidence that TV was introduced systematically earlier or later in places that happened to be more polarized prior to that introduction.

## 2.2 Main Results

We can now turn to the link between the introduction of TV and the evolution of polarization. We start with a first look at the raw data. For that we split the sample between counties that got access

to TV relatively early (before 1952) and those that got it late. We then run a regression of the average polarization variable on year-region dummies, and calculate the mean of the residuals for each group of counties.

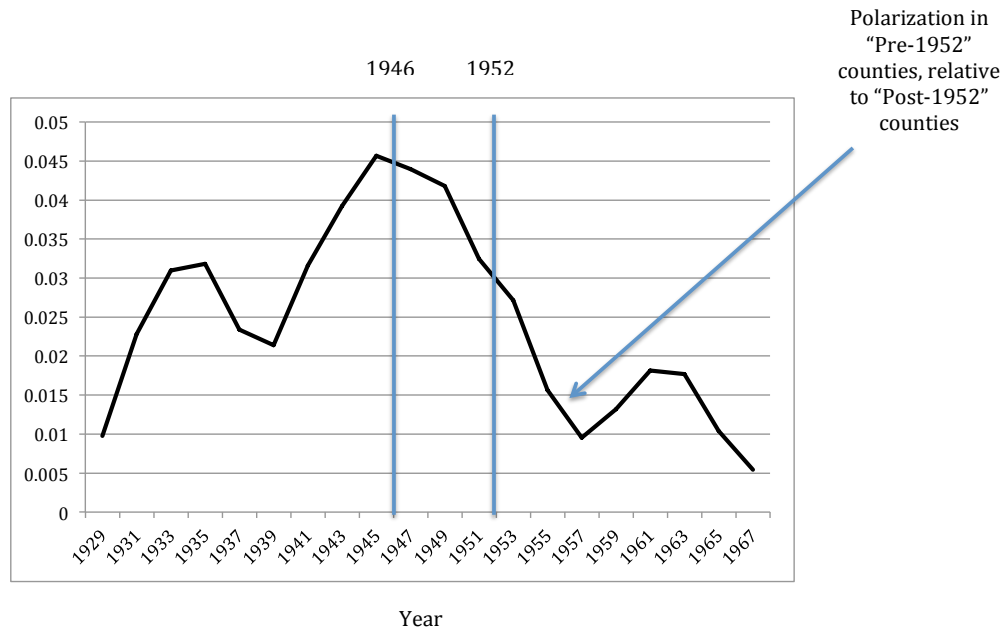
The comparison for relative polarization is depicted in Figure 1, drawn for a three-year moving average around each data point in order to smooth out the noise in the measure. The key dates for the introduction of TV, 1946 (marking the end of the wartime ban on television station construction) and 1952 (the end of the FCC freeze on new television licenses), are marked as vertical lines in the plot. We see a remarkably clear decline after those periods, showing that relative polarization in those counties that got TV early dropped dramatically in comparison with the relative polarization in the latecoming counties. The downward trend starts as TV spreads in the groundbreaking counties, and later flattens out as the latecomers eventually join the fold.

The raw data thus suggest the possibility of a negative effect of TV on polarization, but to go beyond correlations we turn to the regression analysis that implements (1). The results in Table 1 (Columns (1)-(4)) indeed show a negative and significant effect on relative polarization, both measured with respect to average and median. The measure is quantitatively significant: our coefficients would suggest that within the space of two decades exposure to TV would induce a decrease in relative (average) polarization that is around one standard deviation of that polarization sample. The results for absolute polarization (Columns (5)-(6)) go in the same direction, although attenuated. Note that the even-numbered columns add the broader set of demographic controls (interpolated from Census data), which include (the log of) population, population density, percent urban, percent non-White, percent with high-school education, and median income. They also control for the interactions between demographics, and initial polarization, and (a fourth-order polynomial in) time. The results are robust to the inclusion of those controls.<sup>14</sup>

When talking about ideology and polarization in the mid-20th century, it is important to keep in mind that the US South is in a peculiar position. Because of the importance of racial issues in Southern politics, and the transformations brought about by the emergence of the civil rights movement, it is

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<sup>14</sup>The results for polarization are also robust to excluding from the sample the period during World War II, which may be thought of as exceptional – one might argue that the war itself would have had a very strong impact on political behavior and preferences. The coefficients are actually slightly larger, for all measures of polarization. The results are also robust to including a simple linear time trend, and the time trend interacted with the initial value of polarization (in year 1939).



**Notes:** This figure plots the difference between the average residuals for the group of counties where TV first arrived in 1951 or before and the average residuals for the group of counties where TV first arrived in 1952 or after. Residuals are computed from a regression of Average Polarization (absolute value of the difference between DW Nominate score and average score for the country) on region-year dummies, in the sample of counties that are not split into more than one congressional district, between 1940 and 1966. Each value plotted is the three-year moving average centered on the corresponding year (two years for the endpoints of the sample).

Figure 1: Polarization in Pre-1952 Counties (Relative to Post-1952 Counties)

Table 1. Effects of Years of TV on Political Outcomes, 1940-66 (Single-district counties)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	rel. avg.	rel. avg.	rel. median	rel. median	absolute	absolute	turnout	turnout
Years of TV	-0.0041** [0.0016]	-0.0033** [0.0016]	-0.0038** [0.0016]	-0.0029* [0.0016]	-0.0018 [0.0014]	-0.0012 [0.0013]	-0.4220*** [0.0670]	-0.2393*** [0.0689]
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	38574	38047	38574	38047	38574	38047	39506	38152
# of Counties	2908	2857	2908	2857	2908	2857	2997	2857
R-squared	0.048	0.083	0.063	0.099	0.065	0.104	0.643	0.656

Robust standard errors in brackets, clustered by congressional district (per decade). All regressions include county fixed effects, region-year dummies; sample includes only counties that are not split into more than one congressional district. Dependent variables: "rel. avg." = absolute value of the difference between DW Nominate score and average score for the country; "rel. median" = absolute value of the difference between DW Nominate score and median score for the country; "absolute" = absolute value of DW Nominate score; turnout = share of voting-age population voting in congressional election. Independent Variable: "Years of TV" = number of years since the first year in which a commercial station was broadcasting in the county for at least three month. Control variables are: log population, density, % urban, % nonwhite, % high school, median income, and interactions between a fourth order time polynomial and % high school (in 1960), median income (in 1960), and polarization (in the 1939-40 Congress). \*\*\* p<.01, \*\* p<.05, \* p<.1

quite likely that our measure of ideological position should be considerably more precise outside of the South, as previously mentioned. By the same token, even leaving aside issues of measurement, we would expect the dynamics of ideology and polarization to have been very different in that region. We thus repeat in Table 2 the exercise from Table 1, while excluding the Southern states from the sample. The results are striking in that the message from the previous table is now even stronger. The effect is strongly significant for all measures of polarization, relative or absolute, and the size of the coefficients is at least twice as large.<sup>15</sup> Our preferred estimate of the quantitative effect of TV corresponds to a decrease of one standard deviation in the relative (average) polarization over the span of one decade (Column (2)).

To further check the validity of our strategy, we ask whether what we are picking up is indeed the effect of the introduction of the new medium, or rather some trend in polarization that happened to correlate with the timing of that introduction. For that we run a set of placebo regressions. More specifically, we conduct a counterfactual experiment in which TV was introduced into each county ten years before the date at which it actually was.<sup>16</sup> We then ask whether that fictitious episode would appear to have any effect on polarization – if it did, that would indicate that the effect we have attributed to TV could well in fact be picking up some unrelated pre-existing differential trend in polarization. Table 2a displays the reassuring results from this exercise, again in our preferred sample excluding the South and including the full set of control variables. The odd-numbered columns show the results for the full number of years in the sample, and clearly indicate that the placebo has no effect: the coefficients on the fictitious introduction of TV are statistically insignificant, and generally much smaller than what we obtain from Table 2. The even-numbered columns restrict the sample to the period before 1946, to focus on the pre-trend. We can see here that the coefficients are actually positive – not surprising in light of what we see in Figure 1 – but the pre-trend is not significantly different from zero when the controls are present.<sup>17</sup> This clearly indicates that our results reflect the impact of the introduction of

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<sup>15</sup>Note that the difference between the three measures of polarization is essentially a constant, for any given year, across all counties. Of course, this difference cannot be absorbed by year fixed effects because of the non-linearity introduced by the absolute value transformation; more importantly, our results differ across specifications because we allow year effects to vary by region, as per (1). It follows that any difference between the results for the three measures stems mostly from differences in ideological trends across regions. We can thus interpret the convergence between the results, once the South is excluded, as confirmation that those trends in the South were very different than elsewhere.

<sup>16</sup>The results are similar if we use different windows such as eight or six years. These results are available upon request.

<sup>17</sup>To allay concerns that the lack of significance might be due to the relatively smaller sample size, we ran the basic Table 2 specifications for comparably small samples, and the results from that Table are essentially maintained.

Table 2. Effects of Years of TV on Political Outcomes Outside the South, 1940-66 (Single-district counties)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	rel. avg.	rel. avg.	rel. median	rel. median	absolute	absolute	turnout	turnout
Years of TV	-0.0091*** [0.0026]	-0.0087*** [0.0026]	-0.0086*** [0.0026]	-0.0082*** [0.0026]	-0.0058*** [0.0021]	-0.0052*** [0.0020]	-0.6022*** [0.0894]	-0.3212*** [0.0971]
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	20589	20318	20589	20318	20589	20318	21419	20377
# of Counties	1538	1512	1538	1512	1538	1512	1624	1512
R-squared	0.062	0.088	0.068	0.099	0.061	0.103	0.682	0.702

Robust standard errors in brackets, clustered by congressional district (per decade). All regressions include county fixed effects, region-year dummies; sample includes only counties that are not split into more than one congressional district, outside the South (as defined by the Census). Dependent variables: "rel. avg." = absolute value of the difference between DW Nominate score and average score for the country; "rel. median" = absolute value of the difference between DW Nominate score and median score for the country; "absolute" = absolute value of DW Nominate score; turnout = share of legally eligible voters casting votes in congressional election. Independent Variable: "Years of TV" = number of years since the first year in which a commercial station was broadcasting in the county for at least three month. Control variables are: log population, density, % urban, % nonwhite, % high school, median income, and interactions between a fourth order time polynomial and % high school (in 1960), median income (in 1960), and polarization (in the 1939-40 Congress).

\*\*\* p<.01, \*\* p<.05, \* p<.1

Table 2a. Placebo Regressions: Effects of “Years of TV” (Ten Years Ahead) on Political Outcomes Outside the South, 1940-66 (Single-district counties)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	rel. avg.	rel. avg.	rel. median	rel. median	absolute	absolute	turnout	turnout
Years of TV (placebo)	-0.0000	0.0058	0.0001	0.0077	-0.0030	0.0052	0.0561	0.2982
	[0.0063]	[0.0048]	[0.0057]	[0.0051]	[0.0054]	[0.0045]	[0.2112]	[0.2271]
Pre-1946 only	No	Yes	No	Yes	No	Yes	No	Yes
Observations	20482	4263	20482	4263	20482	4263	20377	4275
# of Counties	1512	1458	1512	1458	1512	1458	1512	1458
R-squared	0.082	0.085	0.068	0.051	0.064	0.107	0.700	0.864

Robust standard errors in brackets, clustered by congressional district (per decade). All regressions include county fixed effects, region-year dummies; sample includes only counties that are not split into more than one congressional district, outside the South (as defined by the Census). Dependent variables: “rel. avg.” = absolute value of the difference between DW Nominate score and average score for the country; “rel. median” = absolute value of the difference between DW Nominate score and median score for the country; “absolute” = absolute value of DW Nominate score; turnout = share of legally eligible voters casting votes in congressional election. Independent Variable: “Years of TV” = number of years since ten years before the first year in which a commercial station was broadcasting in the county for at least three month. Control variables are: log population, density, % urban, % nonwhite, % high school, median income, and interactions between a fourth order time polynomial and % high school (in 1960), median income (in 1960), and polarization (in the 1939-40 Congress).

\*\*\* p<.01, \*\* p<.05, \* p<.1

TV, rather than some underlying secular trend that might have affected polarization.

We can gain further insight into the nature of the results by looking at the data in a slightly less parametric way. If we consider only counties that are consistently left- or right-wing, in the sense that they are always to the left or always to the right of the national average, we can have a better idea of whether the driving force behind the reduced polarization are movements towards the center or ideological “switches” from left to right or vice-versa. This is what we do in Table 3, still focusing on the sample excluding the South. The dependent variable is the DW Nominate score, along the left-right spectrum. As we can see from Columns (1)-(2), the right-wing counties became less right-wing; Columns (3)-(4) show that the left-wing counties, which are much less numerous, also moved to the center. This



Table 3. Effects of Years of TV on Political Outcomes Outside the South,  
1940-66 (Single-district counties)  
Right-wing vs Left-wing Counties

	(1)	(2)	(3)	(4)
Dep. Variable: DW Nominate Score	Left	Left	Right	Right
Years of TV	0.0074** [0.0035]	0.0051 [0.0035]	-0.0150*** [0.0045]	-0.0108*** [0.0045]
Controls	No	Yes	No	Yes
Observations	440	387	4635	4634
# of Counties	36	29	335	334
R-squared	0.497	0.432	0.096	0.179

Robust standard errors in brackets, clustered by congressional district (per decade). All regressions include county fixed effects, region-year dummies; sample includes only counties that are not split into more than one congressional district, outside the South (as defined by the Census). Dependent variable: DW Nominate score; “Left” (resp. “Right”) sample includes only counties where the DW nominate score was below (resp. above) the national average for all years in the sample. Independent Variable: “Years of TV” = number of years since first year in which a commercial station was broadcasting in the county for at least three months. Control variables are: log population, density, % urban, % nonwhite, % high school, median income, and interactions between a fourth order time polynomial and % high school (in 1960), median income (in 1960), and polarization (in the 1939-40 Congress).

\*\*\* p<.01, \*\* p<.05, \* p<.1

provides additional evidence in support of the idea that exposure to TV fostered ideological convergence and hence reduced polarization.

Having established the basic result, we pursue the complementary step of splitting the sample according to terciles of the distributions of observable demographic characteristics. This is what Table 4 shows. In this table, each entry corresponds to the coefficient on “*years of TV*” that is obtained from running a regression such as the one in Table 2. We can see that the coefficients are generally significant, and the signs are negative in all but one case, where the effect is essentially zero. In other words, this underscores the message from our basic results.

The evidence of a negative effect of the introduction of broadcast TV on polarization in the US can

Table 4. Regressions of Average Polarization on Years of TV for Subsets of Counties  
(Outside the South, 1940-1966)

	Lowest third	Middle third	Highest third
<i>Counties partitioned by:</i>			
Population	-0.0182*** [0.0049]	-0.0080*** [0.0030]	-0.0028 [0.0025]
Population density	[-0.0194*** [0.0053]	-0.0065** [0.0028]	0.0008 [0.0026]
% Urban	-0.0150*** [0.0040]	-0.0064** [0.0027]	-0.0056** [0.0025]
Family income	-0.0092** [0.0041]	-0.0095*** [0.0028]	-0.0119*** [0.0028]
% High school	-0.0014 [0.0043]	-0.0020 [0.0024]	-0.0182*** [0.0036]

Robust standard errors in brackets, clustered by congressional district (per decade). Coefficients shown are for Years of TV (defined as in previous tables), when Average Polarization (defined as in previous tables) is regressed on Years of TV, county fixed effects, region-year dummies; sample includes only counties that are not split into more than one congressional district, outside the South (as defined by the Census). Each column gives the coefficient from regressions using only counties that fell into the given third of the data, and each row specifies the demographic characteristic on which counties were divided.

\*\*\* p<.01, \*\* p<.05, \* p<.1

be understood more broadly in the context of its impact on political behavior in general. In particular, broadcast TV has been found to have had a negative impact on turnout in congressional elections in the US (Gentzkow 2006). Columns (7)-(8) in Tables 1 and 2 show the results with turnout as our dependent variable, and quite unsurprisingly confirm that finding.<sup>18</sup> The result is further confirmed when we split the sample according to demographics, in the manner of Table 4, with turnout as the dependent variable: the coefficients on “*years of TV*” are always negative, and typically significant, as shown in Table 5.<sup>19</sup>

In sum, there is strong evidence that the introduction of broadcast TV led to decreased polarization, and that this was associated with decreased turnout, at the level of congressional politics in the US.

## 2.3 Some Additional Evidence: The Case of Radio

It is interesting to contrast what we have identified from the introduction of broadcast TV with the patterns associated with another important change in the media landscape two decades before: the rise of the radio. While the data do not afford us the kind of identification that the introduction of TV did, with the exogenous component to the variation that it had, it is nevertheless interesting to look at the correlations between different types of radio exposure and the evolution of polarization.

Similarly to the case of TV, the diffusion of radio was also very fast and its influence widespread, starting in the 1920s and through the 1940s. As it turns out, the medium progressively changed from an essentially local phenomenon to a landscape dominated by a few radio networks. Starting in the late 1920s – after the creation of the first two major networks (NBC and CBS) in 1926-27 and the Radio Act of 1927, which favored consolidation as a way of organizing the allocation of the radio spectrum – and picking up speed in the 1930s and 1940s, the dominant trend was the spectacular rise of the networks that underpinned the so-called “golden age” of radio. By the late 1940s, almost all stations were affiliated to one of the four major networks, as ABC (which was spun off by NBC due to regulatory

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<sup>18</sup>The results are not exactly identical to Gentzkow’s due to differences in the years of coverage, and the fact that Gentzkow includes as a control variable the absolute difference in the share of the two-party vote. We refrain from including this variable, since it should be closely related with our main outcome variable of interest, namely polarization. Finally, we also differ in that we include the interaction of (relative) polarization (instead of turnout) with the time polynomial as part of our set of controls, again motivated by the fact that this is our main variable of interest.

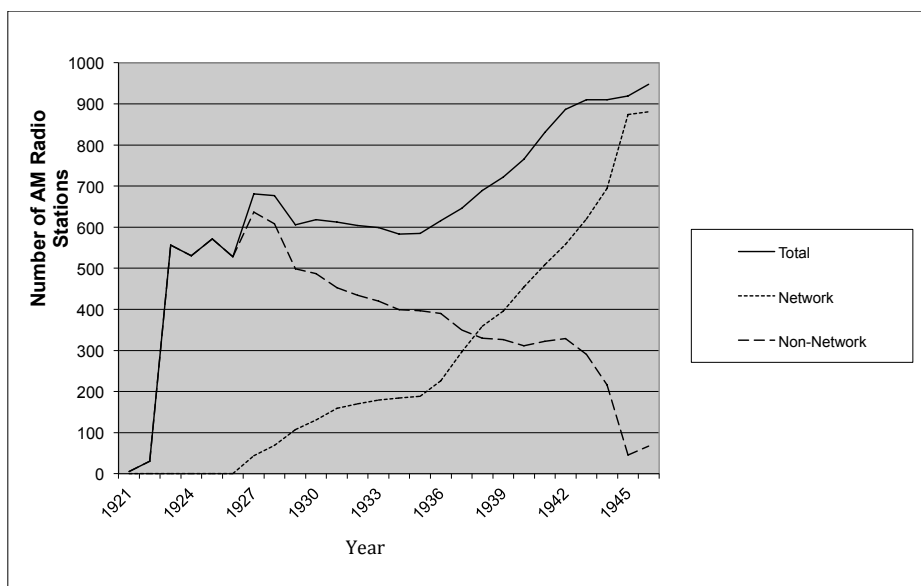
<sup>19</sup>Note that we choose to include the Southern states as our preferred sample, because turnout is not subject to the same type of measurement error. The results are essentially the same if we drop those states.

Table 5. Regressions of Turnout on Years of TV for Subsets of Counties

	Lowest third	Middle third	Highest third
<i>Counties partitioned by:</i>			
Population	-0.5155*** [0.1065]	-0.2555*** [0.0847]	-0.3292*** [0.0769]
Population density	-0.5209*** [0.1207]	-0.2424*** [0.0812]	-0.2131*** [0.0870]
% Urban	-0.5437*** [0.0986]	-0.1441 [0.0901]	-0.3755*** [0.0587]
Family income	-0.1415 [0.1054]	-0.4233*** [0.0925]	-0.5833*** [0.0737]
% High school	-0.1847* [0.1084]	-0.3853*** [0.0841]	-0.6898*** [0.0813]

Robust standard errors in brackets, clustered by congressional district (per decade). Coefficients shown are for Years of TV (defined as in previous tables), when Turnout (defined as in previous tables) is regressed on Years of TV, county fixed effects, region-year dummies; sample includes only counties that are not split into more than one congressional district. Each column gives the coefficient from regressions using only counties that fell into the given third of the data, and each row specifies the demographic characteristic on which counties were divided.

\*\*\* p<.01, \*\* p<.05, \* p<.1



Source: Sterling and Kittross (2002).

Figure 2: The Rise of Radio Networks

pressure) and Mutual had joined the first two. (The pattern is depicted in Figure 2.)<sup>20</sup> As we will see, this evolution will be quite interesting in helping us interpret the mechanisms linking media and polarization.

We collected information on the location and network affiliation of all radio stations in the US, from primary sources – namely, multiple editions of *White's Radio Log*, a publication listing radio stations by name, frequency and call letters.<sup>21</sup> This enables us to know the number of radio stations in each county as well as the subset of those that were indeed affiliated. Data limitations restrict us to the period after 1932, since our sources did not include network affiliation before then.<sup>22</sup> We also limit

<sup>20</sup>For a history of that process, see for instance Sterling and Kittross (2002).

<sup>21</sup>Digitized copies of those editions are available at [http://www.davidgleason.com/Whites\\_Master\\_Page.htm](http://www.davidgleason.com/Whites_Master_Page.htm). Those were monthly or quarterly issues, and we use the first quarter of each year as our reference point. Whenever the corresponding issue is not available, we use the closest available one.

<sup>22</sup>We could not obtain sources for 1937, 1939 and 1941, but because our Nominate data is biannual we have every two-year period represented. For those periods for which we have both years, we use the average as our measure. Each year label in the data corresponds to the year of inauguration of the specific Congress, and the number of radio stations corresponds to the two previous years – under the assumption that this is what would have influenced the election of that Congress.

our attention to the period before the entry of the US into World War II in late 1941, which greatly affected the radio industry across the country, to an extent that makes comparisons over time difficult.<sup>23</sup> We also collect data on the transmission power of every radio station, since their reach would vary a lot depending on that power.<sup>24</sup> We then weigh each station by the square root of its power – because distance reached varies with that square root. We end up with the power-weighted number of radio stations that are located in each county, which we term “*radio exposure*”, and its network component, (“*network exposure*”). This will give us an idea of the degree of exposure to radio, and of the variety embedded in that exposure, that each county would have – albeit an imperfect one, since radio signals evidently do not stop at county lines.

We use a similar regression specification to the one we used for TV, minus the interactions that were then used to enhance the identification strategy. The results are shown in Table 6. Column (1) shows a negative and significant correlation between radio exposure and relative polarization.<sup>25</sup> For a sense of magnitudes, the coefficient implies that the impact of a one standard deviation increase in radio exposure among the counties with radio stations (as of 1939) would correspond to a reduction of just under 0.3 s.d. in the measure of polarization.

Column (2) then differentiates between network and non-network stations. What we see is that, while the correlation is significant for network and not for non-network stations, the size of the coefficients does not suggest a meaningful difference across the two types. (The non-network coefficients are less precisely estimated – not surprisingly in light of the explosion of network radio at the time.) The same pattern is very much true when it comes to our other measures of polarization, as shown in Columns (3)-(6). It is interesting that the results do not come from contrasting counties that are measured to have zero radio exposure – which we have noted to be imperfectly measured, as radio signals do not stop at county lines. In fact, they are remarkably similar, both in terms of coefficient size and their

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<sup>23</sup>In February 1942 the FCC imposed a freeze on new stations due to the wartime rationing, which lasted until August 1945. In 1941 a freeze in the production of radio sets also set in.

<sup>24</sup>The importance of this weighting is evident from the fact that network stations were typically much more powerful, by an order of magnitude, than their unaffiliated counterparts. For instance, in 1935 the average American city would have just over 3,000 watts of power coming from its average network station, and a mere 500 watts coming from its average unaffiliated station.

<sup>25</sup>Note that we adopt the specification with all counties, as opposed to those with a single congressional district. This is because a lot of the interesting variation, when it comes to differences in network penetration, comes from large cities, which are disproportionately left out when focusing on single-district counties. On the other hand, this underscores the caveat that the variation in network exposure is far from exogenous.

Table 6. Effects of Radio Exposure on Political Outcomes, 1932-41 (All counties)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	rel. avg.	rel. avg.	rel. median	rel. median	absolute	absolute	turnout	turnout
Radio Exposure	-0.00017*** [0.00006]		-0.00017*** [0.00005]		-0.00010** [0.00005]		0.0070** [0.0028]	
Network		-0.00016*** [0.00005]		-0.00015*** [0.00005]		-0.00011** [0.00005]		0.0067** [0.0032]
Non-Network		-0.00019 [0.00022]		-0.00021 [0.00023]		-0.00007 [0.00021]		0.0106** [0.0046]
Observations	14406	14406	14406	14406	14406	14406	15070	15070
# of Counties	2951	2951	2951	2951	2951	2951	3088	3088
R-squared	0.195	0.195	0.180	0.179	0.222	0.222	0.491	0.491

Robust standard errors in brackets, clustered by county. All regressions include county fixed effects, region-year dummies, and full set of control variables. Dependent variables: "rel. avg." = absolute value of the difference between DW Nominat score and average score for the country; "rel. median" = absolute value of the difference between DW Nominat score and median score for the country; "absolute" = absolute value of DW Nominat score; turnout = share of legally eligible voters casting votes in congressional election. Independent Variables: "Radio Exposure" = number of radio stations located in county, weighted by the square root of station transmission power. Control variables are: log population, density, % urban, % nonwhite.

\*\*\* p<.01, \*\* p<.05, \* p<.1

statistical significance, when obtained from the sample restricted to counties with positive exposure (available upon request).

A notable difference arises with respect to the TV evidence, however, when we look at the evidence on turnout. Column (7) in Table 6 shows some evidence of a correlation between exposure to radio and turnout, in line with the results that Strömberg (2004) obtains. Column (8) in turn suggests that again there is not much of a distinction between affiliated and unaffiliated stations.<sup>26</sup>

In sum, and with the caveat that no causality claim is warranted from this evidence, the results are consistent with the idea that radio had a similar depolarizing effect to that which TV would also have later on. In particular, this effect does not seem to differ substantially between exposure to network and non-network stations. On the other hand, the pattern for turnout is in the opposite direction of what was found in the case of TV.

### 3 TV and Polarization: Interpreting the Evidence

What might explain the effect we have just outlined? We now sketch a very simple model of electoral competition with endogenous turnout that systematizes the links between media environment and the positions chosen by politicians. It is just about the simplest possible version that can shed light on the mechanisms through which a change in that environment, such as the introduction of TV, can lead to reduced polarization. The central message of this framework is that changes in media environment may affect polarization due to their effects in citizens' ideologies and political motivation, but that these channels can be distinguished as they are likely to have different effects on turnout.

#### 3.1 A Simple Model

Consider an ideology space  $X = \{L, M, R\}$  and a continuum of voters of mass 1. Without additional loss of generality, we assume that  $L$ ,  $M$  and  $R$  are numbers such that  $L < M < R$ , and that  $L$  and  $R$  are equally distant from  $M$  (i.e.,  $M = \frac{L+R}{2}$ ). Citizens (potential voters) can have different preferred ideological positions: left-wing citizens prefer  $L$ , moderates prefer  $M$  and right-wing citizens prefer

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<sup>26</sup>That said, these results do seem to be coming mostly from the contrast with zero-exposure counties, as the coefficients are substantially smaller when the sample is restricted (available upon request).



$R$ . We denote the share of moderate voters by  $m \in [0, 1]$ , and assume for simplicity that there is an equal number of left- and right-wing citizens,  $\frac{1-m}{2}$ . As such,  $m$  (inversely) captures the degree of mass polarization in the polity.

There are two parties, which choose and announce their platforms, in terms of ideological positions. These two parties care about being elected, and their platforms will affect the behavior of voters. However, they also have ideological preferences: Party  $l$  leans left, so that it chooses between  $L$  and  $M$  and gets additional payoff from picking the former; similarly, Party  $r$  leans right and gets additional payoff from picking  $R$  over  $M$ . We can think of their choice of platform as determining the degree of elite polarization that will emerge in equilibrium.

More formally, party  $l$  chooses its platform  $x_l \in \{L, M\}$  and Party  $r$  chooses  $x_r \in \{M, R\}$ . The profile of platforms is denoted  $\mathbf{x} = (x_l, x_r)$ . Given a profile  $\mathbf{x}$ , let  $V_i(\mathbf{x})$  denote the votes obtained by party  $i$  and  $\mathbf{1}_i(\cdot)$  be an indicator that takes the value 1 if its argument is equal to party  $i$ 's preferred platform and 0 otherwise,  $i \in \{r, l\}$ . For example,  $\mathbf{1}_l(L) = 1$  and  $\mathbf{1}_l(M) = 0$ . The utility of party  $i \in \{r, l\}$  is given by

$$\Pi_i(\mathbf{x}) = [V_i(\mathbf{x}) - V_j(\mathbf{x})] + \alpha \mathbf{1}_i(x_i) \quad (2)$$

where  $j \neq i$  and  $\alpha \geq 0$ . The term in square brackets is party  $i$ 's margin of victory, and is meant to capture the office motive in simplified fashion. The second term, which essentially implies that the party gets a “bonus” of utility when it picks its preferred position instead of the moderate one, captures the ideology motive. The parameter  $\alpha$  measures the importance of ideology relative to the office motive: if  $\alpha = 0$  then parties care only about winning office, and for  $\alpha$  sufficiently large they care exclusively about ideology. We assume that  $\alpha$  takes an intermediate value,  $0 \leq \alpha < 1$ , so that, as we show later, each motive can prevail depending on voters' preferences.<sup>27</sup>

Voters decide whether to vote or not and, if they do turn out, who to vote for. We assume that voting is sincere (non-strategic), so that citizens who choose to vote will select the party or candidate whose platform is closest to their preferred ideology, and flip a coin in case they are indifferent. We let

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<sup>27</sup>Note that the ideology motive is related to the platform, and not to whatever policy might prevail. We find this to be a better description of a context, such as that of the US congressional elections on which our empirical analysis focuses, where candidates do not directly determine what policy will be. In such a context, it makes more sense to assume they care about what they will defend as a platform – be it because of individual preferences, pressure from the party or key constituents, etc.

citizens also differ in terms of their intrinsic political motivation, which we assume can be either *weak* or *strong*. We denote the share of strongly motivated citizens by  $s \in [0, 1]$ , and we assume for simplicity that those citizens always turn out to vote.

The turnout decisions of weakly motivated citizens, in contrast, depend on the platforms chosen by parties and how they relate to their own ideological preferences. We consider two standard forces behind those decisions. First, there is a “consumption” component that has to do with how much the voter cares about which party wins the election (as in Aldrich 1993 and Glaeser, Ponzetto, and Shapiro 2005). In addition, there is an “alienation” component whereby a citizen is more motivated to vote when her preferred option in terms of available platforms is closer to her true preferred ideology (Hinich and Ordeshook 1969, 1970).

We formalize the behavior of voters as follows. If voter  $v$  has a preferred platform  $x^v \in \{L, M, R\}$  her preference for the platform of party  $i$ ,  $x_i$ , is measured by  $W(|x^v - x_i|)$ , where  $W(\cdot)$  is a strictly decreasing function. Without further loss of generality, we assume that  $W(0) = 0$ , and hence  $W(z) < 0$  for all  $z > 0$ . The consumption utility of voter  $v$  when her preferred party is  $l$  is measured by a term  $U^{cons}(x_l, x_r; x^v) = W(|x^v - x_l|) - W(|x^v - x_r|)$ . In general,  $U^{cons}(x_l, x_r; x^v) = |W(|x^v - x_l|) - W(|x^v - x_r|)| \geq 0$ . The alienation component is simply  $U^{alien}(x_i; x^v) = \gamma W(|x^v - x_i|)$ . Thus, given a profile of platforms  $(x_l, x_r)$ , the utility of voter  $v$  from turning out and voting for party  $i$  is

$$U_i^v(x_l, x_r; x^v, d^v) = U^{cons}(x_l, x_r; x^v) + U^{alien}(x_i; x^v) + d^v$$

where  $d^v$  captures intrinsic political motivation, which we can think of as “citizen’s duty”. We let  $d^v = \bar{d}$  if  $v$  is a highly motivated citizen, and  $d^v = \underline{d}$  if  $v$  is weakly motivated, with  $\bar{d} > \underline{d}$ . The utility of not turning out is normalized to zero, i.e.,  $U_\emptyset^v = 0$ .

Our first key assumption, to ensure that highly motivated citizens always turn out, is as follows:

**Assumption 1**  $\gamma W(z) + \bar{d} > 0$  for  $z = |R - M| = |L - M|$ .

We further add a few assumptions on the behavior of weakly motivated citizens, which are not meant to be general, but rather reasonable shortcuts to let us focus on the main mechanisms we identify.

**Assumption 2**  $\underline{d} < 0$ .

This assumption means that a weakly motivated citizen does not vote in the absence of consumption value ( $U^{cons} = 0$ ). As a result, if both parties chose  $M$  (no polarization), no weakly motivated citizen turns out. The assumption also implies that if parties are polarized between  $L$  and  $R$ , a weakly motivated moderate does not turn out.<sup>28</sup>

**Assumption 3**  $-W(z) + \underline{d} > 0$  for  $z = |R - M| = |L - M|$ .

This assumption means that, if there is a party that matches a citizen's ideology (no alienation,  $U^{alien} = 0$ ) and the consumption value of voting is positive ( $-W(z)$  or more), then that citizen turns out in the election. In particular, if parties are polarized between  $L$  and  $R$ , ideologically extreme voters will have a party that matches their ideology. If  $y = |R - L|$ , their utility from turning out will be  $-W(y) + \underline{d} > 0$ , and the assumption ensures that they will turn out.

**Assumption 4**  $W(z) - W(y) + \gamma W(z) + \underline{d} < 0$  for  $z = |R - M| = |L - M|$  and  $y = |R - L|$ .

The assumption states that if the consumption value of voting is minimal and no party matches a citizen's ideology, then that citizen does not turn out. It describes what happens if one and only one of the parties chooses  $M$ : for instance, if  $x_l = M$  and  $x_r = R$ , then moderates and right-wingers vote, while alienated left-wingers do not. This is a simple way of ensuring that an equilibrium with polarization is feasible for some values of the parameters.<sup>29</sup>

Assumptions (2)-(4) together imply that different strategy profiles are associated with a different ideological composition of the electorate. In particular, if parties converge ( $x_l = x_r = M$ ), then the consumption motive is mute and no weakly motivated citizen votes – not even moderates who have candidates that match their preferred ideology ( $U^{alien} = 0$ ). In contrast, if parties diverge to the extremes ( $x_l = L$  and  $x_r = R$ ), then moderates with weak motivation do not vote while extreme voters do, since the consumption value is high for extremists but not for moderates. In what follows we characterize the conditions that make convergence or divergence a Nash equilibrium of this electoral game with endogenous turnout.

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<sup>28</sup>Indeed,  $U^{cons}(L, R; M) = 0$  and since the alienation component is negative,  $U^{alien}(x_i; x^v) + \underline{d} < 0$ .

<sup>29</sup>Following up on this example, we should point out that our results are preserved under any assumption ensuring that in a case like this right-wingers (i.e. extremists having  $U^{alien} = 0$ ) are at least as likely to vote as moderates and left-wingers. This implies that the gains obtained by a party that deviates from the profile  $(L, R)$  are not too attractive. Note also that the alienation motive is central to this assumption: since  $W(z) < 0$ , a sufficient condition for the assumption to hold is for  $\gamma$  to be large enough, i.e., a strong alienation motive. On the other hand, it is easy to see that if  $W(\cdot)$  is weakly concave (e.g. negative quadratic) and  $\gamma = 0$ , then Assumption 3 implies that Assumption 4 cannot be satisfied. In other words, a sufficiently strong alienation motive is also necessary.

### 3.1.1 Results

As is well-understood, if parties only cared about seeking office, then the only equilibrium would involve convergence to the median voter's preferred ideology,  $M$ . The ideology motive introduces a centrifugal push. In particular, depending on the parameters  $m$  and  $s$  that describe the distribution of ideologies and motivation, this assumption allows for a symmetric equilibrium with polarization: Party  $l$  chooses  $L$  and Party  $r$  chooses  $R$ .

Except for a knife-edge case, there is a unique symmetric equilibrium: given  $m$  and  $s$ , either the two parties converge to the middle, or else they polarize.<sup>30</sup> The conditions under which either will occur can be described formally as:

**Proposition 1** *The unique symmetric equilibrium has both parties choosing the median voter ideology, that is,  $x_l^* = x_r^* = M$ , if  $m \in [\alpha, 1]$  and  $s > s(m) \equiv 3 - \frac{2(1-\alpha)}{1-m}$ . Otherwise, the unique symmetric equilibrium involves polarization, that is,  $x_l^* = L$  and  $x_r^* = R$ .*

Figure 3 illustrates the combinations of  $m$  and  $s$  – the values of the share of moderates and the share of strong-political-motivation individuals – that are associated with convergence or polarization of preferences. Convergence occurs to the “northeast” of the boundary defined by the decreasing function  $s(m)$ , namely for relatively high values of the share of moderates  $m$  and of highly motivated  $s$ ; conversely, polarization prevails to the “southwest”, that is for relatively low values of  $m$  and  $s$ .

The intuition is very simple, and can be gleaned from considering two extreme cases. We have assumed that  $\alpha \leq 1$ , i.e., the ideology motive is bounded. In this case, if  $s = 1$  everyone votes, and parties prefer the median voter platform  $M$  over their preferred ideology. In other words, the incentive to moderate in order to steal votes from the opponent prevails. The same is true if  $m = 1$  and all voters are moderate. On the other hand, if  $s = 0$  all citizens have a weak motivation and it pays to choose an extreme platform – not only because it matches the party's preferred ideology, but also because it attracts extreme voters, who are more likely to vote. Of course, there is also an incentive to polarize if there are no moderates,  $m = 0$ . More generally, the incentive to move towards moderation increases as the shares  $s$  and  $m$  of strong political motivation and ideologically moderate citizens increases.

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<sup>30</sup>See the Appendix for details on the solution.

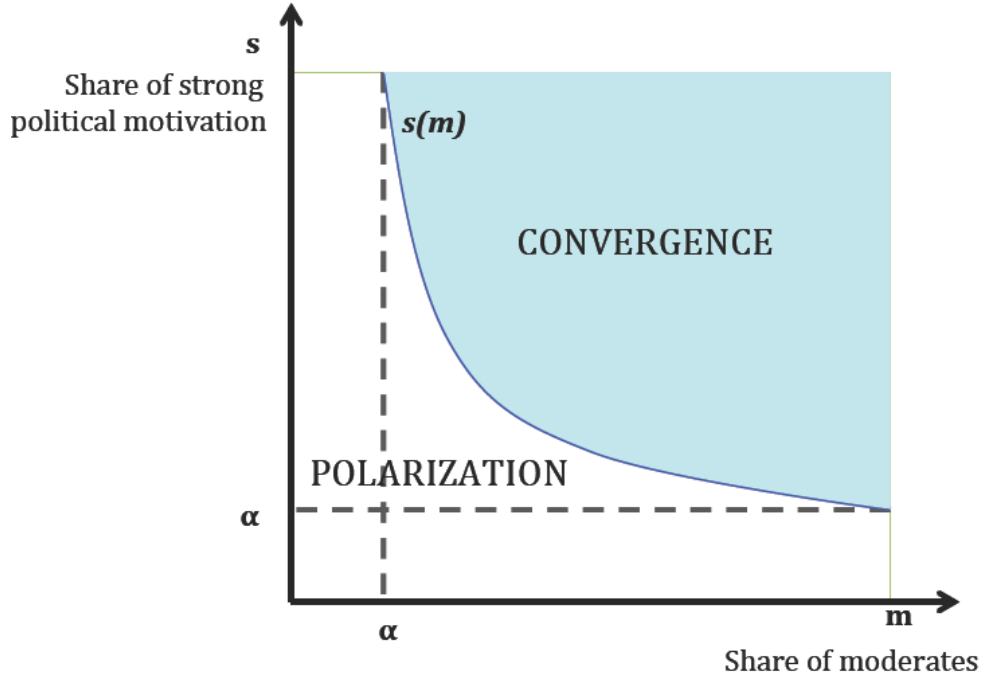


Figure 3: Polarization and convergence regions

This rather simple model lets us make sense of the possible channels of impact of a new media technology, say broadcast TV, by translating such impact in terms of the changes it may induce in the distribution of ideological positions (as captured by  $m$ ) and in the levels of political motivation (as captured by  $s$ ). We will call these two channels the *ideology effect* and the *motivation effect*, respectively.<sup>31</sup>

To fix ideas, and motivated by our empirical results, let us consider a decrease in polarization. A simple inspection of Figure 3 illustrates that this could come about in a combination of two ways: an increase in moderation ( $m$ ) or an increase in the level of political motivation ( $s$ ). Let us consider them in order, starting with:

**Proposition 2** (*Ideology Effect*) *Fix  $s = s_0$ . If the introduction of a new media technology increases the share of moderate citizens from  $m_A$  to  $m_B$ , where  $m_A < m(s_0)$  and  $m_B > m(s_0)$  then:*

(a) *Polarization decreases;* and (b) *Turnout decreases.*

Figure 4 illustrates the ideology effect. For any fixed level of  $s = s_0$ , there is a threshold level  $m(s_0)$  in the boundary between the polarization and the convergence equilibrium regions. Moving from a level

<sup>31</sup>The working paper version of this paper (Campante and Hojman 2010) offers a microfoundation for how changes in the media market affect media choice and political ideology. We have chosen to drastically simplify the model to streamline the main channels identified by our framework.

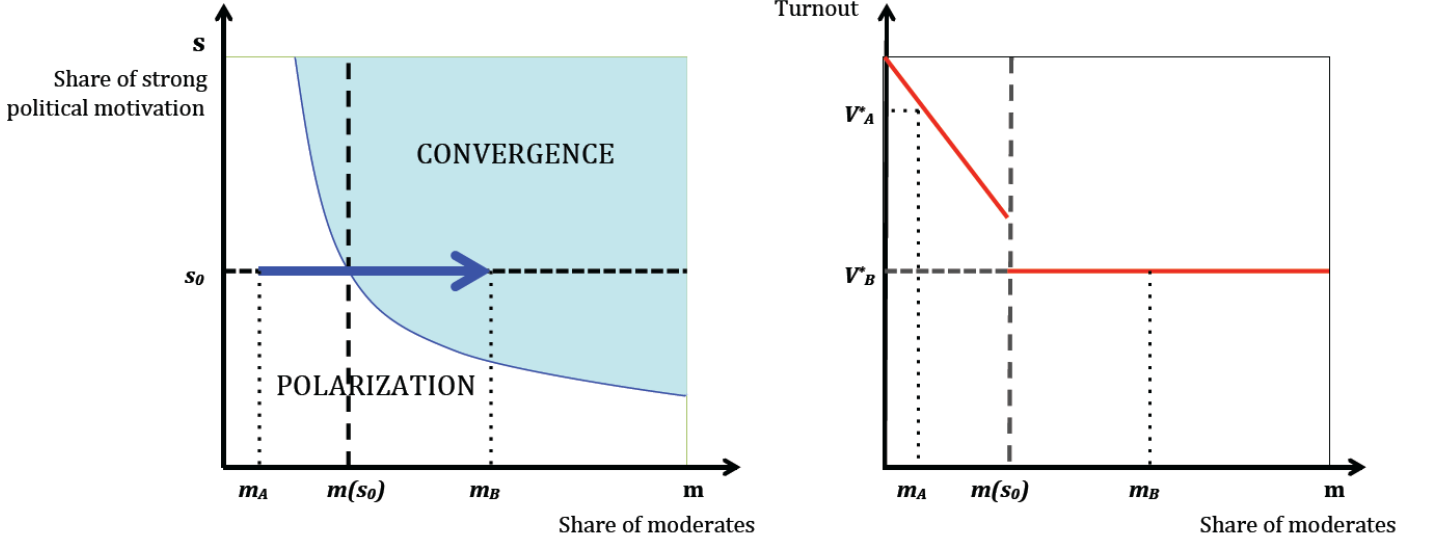


Figure 4: Ideology effect: Increase in the share of moderates from  $m_A$  to  $m_B$  leading to lower polarization and turnout

of moderation below this threshold to one above it decreases polarization. The intuition is quite clear: when there are more moderates, parties have a stronger incentive to move towards moderation.

This is also associated with changes in turnout. In an equilibrium with polarization, in addition to those citizens with a strong intrinsic motivation, weakly motivated citizens who are not moderates also vote. It follows that turnout decreases when there are more moderates. (Formally, turnout is given by  $V^* = s + (1 - s)(1 - m)$ , which obviously decreases with  $m$ .) In contrast, in an equilibrium in which parties converge to median voter platform, only citizens with strong political motivation vote and turnout is given by  $V^* = s$ . The right panel in the figure shows turnout as a function of the share of moderates. In particular, the rise in  $m$  is broadly associated with a drop in turnout.

**Proposition 3** (*Motivation Effect*) *Fix  $m = m_0$ . If the introduction of a new media technology increases the share of citizens with strong political motivation from  $s_A$  to  $s_B$ , where  $s_A < s(m_0)$  and  $s_B > s(m_0) + (1 - m_0)s(m_0)$  then: (a) Polarization decreases and (b) Turnout increases.*

Figure 5 illustrates the motivation effect. For a fixed  $m = m_0$ , the threshold level  $s(m_0)$  is such that above this level the equilibrium involves platform convergence and below this level we have polarization. Moving from a low to a high level of political motivation is thus associated with a decrease in polarization. The intuition is as follows: newly motivated citizens are joining the pool of voters, and because those

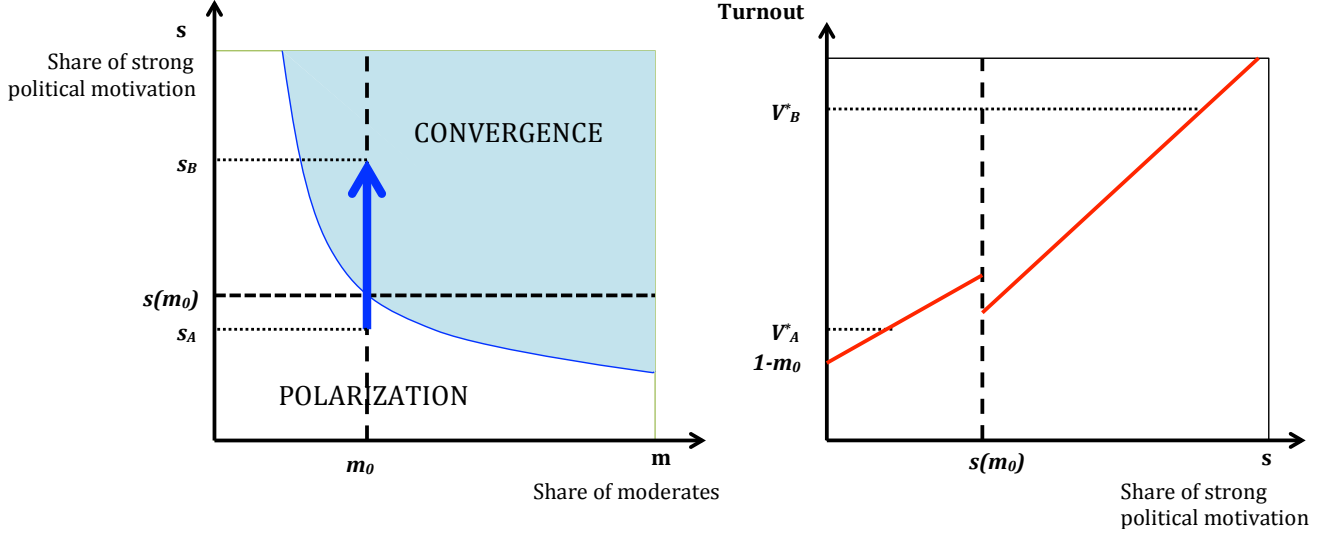


Figure 5: Motivation Effect: Increase in the share of politically motivated from  $s_A$  to  $s_B$  leading to lower polarization and higher turnout

who did not vote initially are disproportionately moderate, so are these new voters. Parties thus have a stronger incentive to moderate as well.

This is again, and quite obviously, associated with a change in turnout, as shown by the picture on the right panel of Figure 5. Note that turnout is discontinuous at the threshold, as weak motivation citizens drop out of the electorate if parties converge, and then increases as the share of strong motivation voters rises. Hence, in spite of the drop in turnout at the point of discontinuity, if the share of strongly motivated citizens increases enough, so does turnout. We note briefly that the discontinuity is an artifact that arises from having a discrete set of ideologies.<sup>32</sup>

In sum, the ideology effect (changes in  $m$ ) induces polarization and turnout to move in the same direction, whereas the motivation effect (changes in  $s$ ) will see them move in opposite directions.

### 3.2 Interpreting the Evidence

We now seek to explain the evidence in light of the model and discuss alternative explanations. Let us start by noting that the early days of television were marked by low variety in terms of content: “the most popular mass medium ever offered the lowest degree of content choice of any mass medium.”

<sup>32</sup>In the working paper version (Campante and Hojman 2010), we consider a continuum of ideologies and show that turnout is continuous and increases monotonically with  $s$ . The choice of a discrete model makes the exposition and proofs much simpler.

(Prior, 2007, p. 68) Few channels were available – an average of three stations per market in 1965 – and these were essentially retransmitting network programming, exposing different markets to very similar content. Last but not least, both because of FCC regulation and market-driven choices, the content provided by each network was quite similar to what was offered by the others: as put by Webster (1986, p. 79) “there is no significant difference in what a viewer can see on ABC, CBS, and NBC”, the three major networks at the time. This narrow set of options, not surprisingly, tended to be restricted to middle-of-the-road, “mainstream” content. To the extent that low variety and mainstreaming affected ideological views, it was likely associated with a compression of the distribution of ideologies and an increase in moderation. In our model, this ideology effect would translate into depolarization and lower turnout (Proposition 2), and would thus be entirely consistent with the empirical findings.<sup>33</sup>

The impact of the introduction of TV on political motivation is less obvious. It has been argued that the arrival of TV entailed an increase in the political involvement of relatively disengaged (and disproportionately moderate) individuals, due to incidental exposure to political content (Prior 2007). If so, it could have increased the incentives of parties to moderate, as indicated by Proposition 3. On the other hand, this motivation effect would also predict an increase in turnout that is not consistent with the evidence.

It follows that, within the context of our model, the evidence on the negative impact of TV on turnout would suggest a prevalence of the ideology effect in driving polarization to fall. Further evidence in that regard can be gauged from Table 4: the drop in polarization is quantitatively smaller in the less educated counties, whereas one would have expected that any impact of TV on the political motivation of previously alienated individuals would have been more important in those places.<sup>34</sup>

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<sup>33</sup>Strictly speaking, our model is framed in terms of polarization *within* a congressional district, but since we only have the measure of ideological position for the incumbent, it is not possible to observe that type of polarization. We can reinterpret the model, however, in terms of the comparison *across* counties, and TV would indeed act as a depolarizing force. First, to the extent that TV affected ideological positions, the fact that it brought content that was relatively middle-of-the-road and uniform across different places, suggests that it would move the moderate position in any given county (with access to TV) closer to the national center. Second, it is reasonable to expect, in practice, that relatively left-wing locations would be more likely to elect the more left-wing party, and conversely for right-wing locations. Putting these two together, it follows that an increased likelihood of convergence to a moderate position in any given location, which is what reduced polarization means in the context of our model, would imply an increased likelihood of locating closer to the national center.

<sup>34</sup>While our analysis has emphasized that the ideology effect in explaining the fall of polarization associated with TV, other channels like the motivation effect could still be at work. From Table 5 one can see that in the poorest, least educated terciles, the effect of introducing TV on turnout is much less negative than in their wealthier, more educated counterparts. This is consistent with the logic of the motivation effect: turnout falls much less (and insignificantly) precisely where the impact of TV on political learning, and hence on increased motivation, should be stronger.



Still, others have argued that TV did not represent an increase in the levels of political information and engagement, at least for local and congressional elections. For instance, Gentzkow (2006) shows evidence that TV caused substitution away from other sources of news, such as newspapers and radio, which contained considerably more coverage of local politics, and also that people who got their news mostly from television were indeed less informed about their congressmen. If TV did induce a decrease in political motivation, our model suggests that it would have been associated with lower turnout – as borne out by the evidence – and, in the absence of additional forces, also with increased polarization, which is at odds with our findings. In short, it seems hard to explain depolarization and the decrease in turnout associated to the introduction of TV on the basis of an effect on political motivation alone.

As for the radio evidence, we start by noting that radio constituted a highly accessible alternative to the print media, the dominant media technology of the day: it did not require literacy, nor reading skills or habit.<sup>35</sup> As such, it could be expected to increase the levels of political information and motivation – a hypothesis underscored by the evidence in Strömberg (2004). The associated drop in polarization and rise of turnout would then be entirely consistent with the motivation effect (Proposition 3).

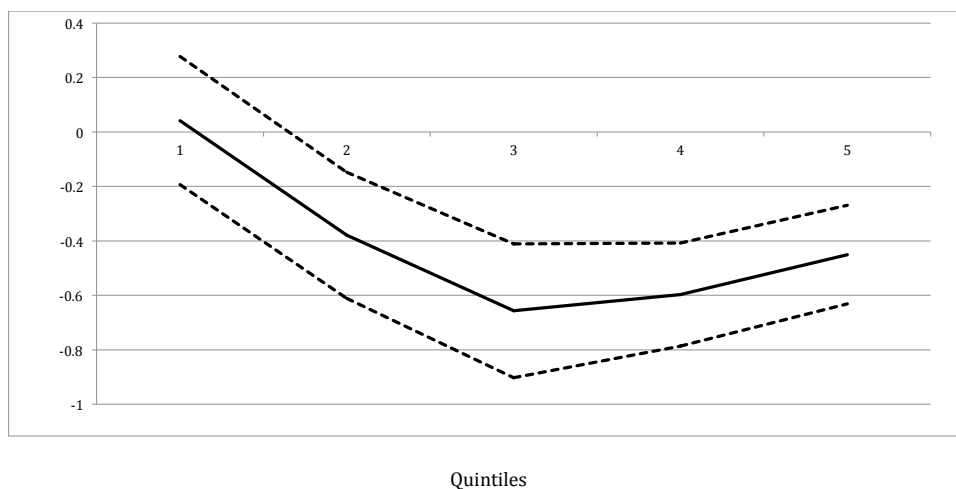
On the other hand, the impact of radio on the distribution of ideological views is not obvious. Its historical evolution went from local stations with lots of variety in terms of content – for instance, stations would often cater to specific ethnic groups (Cohen 1990) – to a much more homogenous industry, through the rise of the radio networks.<sup>36</sup> We would have expected the ideology effect to drive depolarization mostly via the more homogenous network stations, but we see no such difference between network and non-network exposure in the data. What is more, the increase in turnout that accompanied the diffusion of the radio also goes in the opposite direction from what the ideology effect would have predicted. In sum, the radio evidence is inconsistent with a dominant role of the ideology effect and suggests that the motivation effect could be an important part of the story.

Our evidence thus shows that the evolution of media technologies between the 1930s and 1950s

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<sup>35</sup>There is little doubt that radio was a mass medium with a much broader reach than newspapers: by 1938, even at the lowest level of income (below \$1,000 a year) 57% of households had at least one radio set (Sterling and Kittross 2002, p. 204). Considering how radio was often a communally shared experience (Cohen 1990), this understates the true reach of the medium.

<sup>36</sup>As Sterling and Kittross (2002, p. 284) describe, “the national networks exercised great power over individual affiliates. In several cases, when local radio stations wanted to substitute a local program for a network program, network officials threatened to reconsider the station’s affiliation contract. (...) [S]uch threats had great effect, for network affiliation was the key to success.”



**Notes:** This figure plots the coefficients on “Years of TV” that are obtained from running the turnout regressions (Column (8) in Table 2) separately for each quintile of the distribution of the variable “radio share” (percent of county population that owns a radio, as of 1940). Dashed lines represent 95% confidence intervals.

Figure 6: Effect of TV on Turnout, by Radio Penetration Quintile

had a significant role in the drop in polarization observed over that period. A natural interpretation is that radio worked in favor of depolarization by bringing new, more moderate voters to the polls. When TV arrived, that effect was somewhat exhausted, but depolarization was further enhanced by the new medium’s direct impact on citizens’ ideological preferences. We can look directly at this interplay between TV and radio by running turnout regressions, such as in Table 2 (Column (8)), separately for each quintile of the distribution of radio penetration, as measured by the share of dwellings with radio in 1940 (from the Census). The coefficients on “*years of TV*”, depicted in Figure 6, are more pronouncedly negative for those counties that had been more exposed to radio. This is in line with the motivation effect balancing out the negative impact on turnout in the counties least exposed to radio, exactly where we would expect the effect of TV in increasing political knowledge to be stronger.

Beyond the ideology and motivation effects highlighted by our theory, we cannot rule out other potential explanations for the patterns we observe. For instance, we have left aside the possibility that

the changes in political attitudes associated to the introduction of new media could affect differentially different types of voters. For example, radio or TV could have had heterogeneous impacts on the political motivation of individuals with different ideological leanings. Similarly, while our model and the previous explanations emphasize the impact of media on citizens' attitudes, it has been argued that changes in polarization in the United States could be mainly driven by the attitudes of political elites (Fiorina and Abrams 2008). Our empirical results show a causal impact of the introduction of new media on voting and polarization patterns, but we cannot rule out that the main channel behind these changes operates primarily on those elites. On the other hand, an elite-based explanation begs the question of why mass media would affect mainly the elites rather than the rest of the population. At the same time, the growing recent evidence on the causal impact of mass media on citizens' political attitudes underscores the plausibility of the channels we have emphasized.

## 4 Concluding Remarks

This paper provides robust evidence that the introduction of new media in the US affected political polarization. Specifically, the penetration of radio in the 1930s and the introduction of broadcast TV in the post-war period seem to have contributed to the substantial reduction in partisan polarization that occurred around the mid-20th century. Our empirical strategy for the case of TV exploits random components in the timing and spatial patterns of the geographic expansion of the new medium, allowing us to identify a causal impact on the ideological positioning of US representatives. For the case of radio, we use an original dataset on the location of radio stations and their network affiliation to obtain strong correlational evidence of a similar effect.

We argue, using a simple theoretical framework, that this impact of changes in media environment on polarization could go through two different mechanisms: the ideology effect and the motivation effect. The evidence on turnout allows us to distinguish empirically between the two: it suggests that the decrease in polarization following the introduction of TV is consistent with the ideology effect, while that associated with the expansion of radio would be consistent with the motivation effect.

Our framework could apply, in principle, to any change in the media environment. An interesting agenda is to use this framework to study the impact of introducing new media on polarization in recent

decades in the United States, or in countries with different institutional backgrounds. For instance, there has been a steady increase in elite polarization in the US since the 1970s, which has coincided with at least three significant structural changes in the American media environment – the rise of talk radio, the expansion of cable TV, and the Internet – all associated with content differentiation and market segmentation. Our approach suggests that these changes may have contributed to increase polarization both due to the ideology and motivation effects. Clearly, any strong assertion on the specific role of the media would require further careful investigation – ideally with fine data on the media consumption patterns, professed ideology, and turnout behavior of citizens. In particular, distinguishing between these different channels could shed light on the extent to which this elite polarization was accompanied by mass polarization, a subject of considerable controversy (e.g. Layman et al 2006, Fiorina and Abrams 2008, Abramowitz and Saunders 2008).

Finally, other countries have experienced patterns of media adoption that are quite different from that of the US. For example, in many places, the introduction of TV took place in a context where radio was not nearly as universal as it was in the US. Our framework would lead us to expect potentially different implications in terms of polarization. Another important source of variation across countries is the political system. It is unclear that, in multiparty systems with proportional representation as it is common in Europe, the ideology and motivation effects are the same as those derived and discussed for a bipartisan majoritarian system. This is all part of an interesting agenda for future research.

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## A Analysis of the model and proofs

If  $(M, M)$  is an equilibrium, Party  $l$  must prefer  $M$  over switching to  $L$  and, similarly, Party  $r$  must prefer  $M$  over switching to  $R$ . By symmetry, one of the conditions is sufficient, so we focus on the decision of the Left. We have that the payoff for  $L$  associated to the profile  $(M, M)$  is  $\Pi_l(M, M) = 0$ . If Party  $l$  deviates to  $L$  its payoff is  $\Pi_l(L, M) = V_l(L, M) - V_r(L, M) + \alpha$ . The condition for a  $(M, M)$  to be an equilibrium is thus

$$V_l(L, M) - V_r(L, M) + \alpha \leq 0. \quad (3)$$

A similar computation shows that the condition for an equilibrium with polarization is given by

$$\alpha \geq V_l(M, R) - V_r(M, R). \quad (4)$$

Now, by symmetry,  $V_l(M, R) = V_r(L, M)$  and  $V_r(M, R) = V_l(L, M)$ . Using this in (4) we see that the condition for an equilibrium with polarization can be rewritten as

$$V_l(L, M) - V_r(L, M) + \alpha \geq 0,$$

which is exactly the opposite of (3). That is, both equilibria can only coexist if both (3) and (4) are satisfied simultaneously. This can only hold in the knife-edge case of equality.

From our assumptions about voters' behavior, if Party  $l$  chooses  $L$  and Party  $r$  chooses  $M$ , weak motivation citizens who are left-wingers vote for Party  $l$ , moderates vote for Party  $r$ , and right-wingers do not vote. Thus,

$$V_l(L, M) = (1 - m)/2 \text{ and } V_r(L, M) = s(1 - m)/2 + m. \quad (5)$$

Using (5) in (3), it follows that  $(M, M)$  is an equilibrium if and only if  $\alpha \leq s \frac{(1-m)}{2} + m - \frac{(1-m)}{2}$  so that

$$s \geq s(m) = 3 - \frac{2(1 - \alpha)}{1 - m}. \quad (6)$$

This is exactly the condition in Proposition 1. Note that  $s(m) < 0$  for  $m > (1 + 2\alpha)/3$  and  $s(m) > 1$  for  $m < \alpha$ .

The proofs of Propositions 2 and 3 follow directly from Proposition 1 and the discussion in the main text.

## B Appendix Tables

**Table A1. Raw Correlation between Political Variables (as of 1938) and Years of TV at the Congressional District Level Outside the South**

Democrats Win (Congressional)	0.0090 (0.7111)
Democratic Share (Presidential)	0.0105 (0.6661)
Democratic Share (Congressional)	-0.0054 (0.8262)
Absolute Difference (Congressional)	0.0141 (0.5645)
Congressional Turnout	-0.0117 (0.6325)

p-values in parentheses. Democrats Win: Dummy equal to 1 is Democratic candidate won local election; Democratic Share: Share of two-party vote obtained by Democratic candidate in local election (presidential as of 1940); Absolute Difference: Difference between vote share of winning and losing candidate in two-part vote; Turnout: Share of legally eligible voters casting votes in congressional election.

**Table A2. Year of TV Introduction and Polarization in 1939-1940, by DMA**

Dependent Variable: TV Year	(1) rel. avg.	(2) rel. median	(3) absolute
Polarization	-1.0469 [1.8988]	-0.3767 [1.5021]	-0.5926 [1.6709]
Observations	156	156	156
R-squared	0.4133	0.4122	0.4125

Robust standard errors in square brackets. OLS regressions at DMA level of TV Year (first year TV was introduced in DMA) on polarization, log population and log median income at DMA level (unweighted averages), as of 1939. Polarization: "rel. avg." = absolute value of the difference between DW Nominate score and average score for the country; "rel. median" = absolute value of the difference between DW Nominate score and median score for the country; "absolute" = absolute value of DW Nominate score.