Television and Voter Turnout

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Abstract

I use variation across markets in the timing of television’s introduction to identify its impact on voter turnout. The estimated effect is significantly negative, accounting for between a quarter and a half of the total decline in turnout since the 1950s. It is robust to a range of controls and alternative specifications, and interacts intuitively with county characteristics. I argue that substitution away from other media with more political coverage provides a plausible mechanism linking television to voting. As evidence for this, I show that the entry of television in a market coincided with sharp drops in consumption of newspapers and radio, and in political knowledge as measured by election surveys. I also show that both the information and turnout effects were largest in off-year congressional elections, which receive extensive coverage in newspapers but little or no coverage on television. Finally, I look at television markets which are fragmented across many congressional districts. This should reduce television coverage of congressional races, making the effect on turnout more negative, but have no effect on coverage of presidential races. Although first-stage evidence on information is inconclusive, the effect of television on turnout varies with the number of districts as predicted.

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1 Introduction

Television was first licensed for commercial broadcasting July 1, 1941. By 1960, 87 percent of American households had television sets and they were watching an average of five and a half hours per day (Television Bureau of Advertising 2003). Among the effects predicted by contemporary observers was a “revolution” that television would bring to politics. Elected officials and industry executives pointed variously to an “infinite broadening of the democratic process... giving all Americans a clearer understanding of trends and issues” (Mickelson 1960), a “new direct and sensitive link between Washington and the people” (Stanton 1962), and “a better medium for truth” (Taft 1951).

What took place in the years after television’s introduction was not a broadening of the democratic process, but rather a sharp decline in political participation. Average presidential turnout in both the 1980s and 1990s was lower than in any decade since the 1920s, and outside the south (where a substantial remobilization of black voters muted the decline) it was lower than in any decade since the 1820s.\(^1\) The decline in turnout is especially striking since many legal barriers to voter registration were dismantled during the same period, and education and income—both positively correlated with the propensity to vote—increased substantially.\(^2\) Numerous books have been written about this decline.\(^3\) It has been indicted as a threat to American democracy and a symptom of broader disengagement of Americans from the lives of their communities (Teixeira 1992; Putnam 2000). It is, according to one source, “the most important, most familiar, most analyzed, and most conjectured trend in recent American political history” (Rosenstone and Hansen 1993, 57).

In this paper, I use plausibly exogenous variation in the timing of television’s introduction to show that it caused between a quarter and a half of the turnout decline. I also show that it caused sharp drops in consumption of newspapers and radio, that it reduced citizens’ knowledge of politics as measured in election surveys, and that both the effect on information and the effect on turnout were largest in off-year congressional elections, which receive extensive coverage in newspapers but little or no coverage on television. In light of several decades of literature in economics and political science showing that better information should and does increase voter turnout,\(^4\) these facts suggest

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\(^1\)These turnout figures are based on Rusk (2001). McDonald and Popkin (2001) offer a more precise calculation of the number of eligible voters beginning in 1948, adding corrections for ineligible felons and eligible voters living overseas. They find that these corrections eliminate the slight negative trend in turnout after 1972 that earlier data showed. The corrections do not eliminate the sharp drop in turnout between 1960 and 1972, however, and do not change aggregate voting during the period I study.

\(^2\)The combination of falling turnout and changing demographics was the basis of an article by Brody (1979) entitled “The Puzzle of Political Participation in America.” The legal changes over this period are summarized by Kleppner (1982, 122-123) and Teixeira (1992, 29-30). Teixeira estimates that based on changing demographics alone, voter turnout should have been 3.9 percent higher in 1988 than in 1960.

\(^3\)See Kleppner (1982), Teixeira (1992), and Piven and Cloward (2000).

\(^4\)This literature is reviewed by Feddersen (2004) and discussed in more detail below.
that the crowding out of information provides a plausible mechanism linking television and turnout.

The identification strategy of the paper builds on three key historical facts. The first is that the timing of television’s introduction varied greatly across markets, with the earliest and latest cities separated by more than ten years. Although the timing was far from random, two exogenous events—World War II and the imposition of a licensing freeze between 1948 and 1953 (caused by technical problems with spectrum allocation)—added an element of idiosyncratic variation and greatly extended the time elapsed between television’s introduction in various localities. The second is that when television was introduced, it grew rapidly. In many markets, penetration went from zero to seventy percent in roughly five years, and even in the earliest years the average television household was watching more than four hours per day. The third is that television stations from a given city broadcast over a large area. Even though the earliest television cities were also the largest and wealthiest, their signals reached a heterogeneous group of counties including many that were small and rural. This allows me to control for the possibility of spurious correlation between the timing of television and shocks to voting by controlling for flexible functions of time interacted with county demographics, and by looking at changes in voting within demographically similar groups of counties.\(^5\)

The first set of results quantifies the effect of television on turnout. As a first step, I look directly at relative trends in turnout among three groups of counties: those that got television before World War II, those that got television after the war but before the FCC freeze, and those that got television after the freeze. Consistent with a negative causal effect, turnout in both of the earlier groups fell relative to the third at precisely the time when television was introduced, and the relative trend flattened out once the reference group also had television. I turn next to a similar analysis using panel regressions. In the main specification with county and time-region fixed effects, I find that television reduced voter turnout, and that the effect was significantly larger in off-year congressional elections than in presidential election years. This result is robust to including fourth-order polynomials in time interacted with observable county characteristics, as well as controls for changes in observable characteristics over time. It also remains when the analysis is performed on subsets of counties with similar characteristics. Finally, I show that the magnitude of the effect interacts positively with both the predicted rate of television’s diffusion, and the predicted sensitivity of turnout to election competitiveness.

Overall, I estimate that television reduced off-year turnout in an average county by 2 percent

\(^5\)The crucial identifying assumption is that conditional on a county’s own characteristics, proximity to large cities is not correlated with unobserved shocks to voting in the years when television was first introduced. Even if there were shocks to large cities in the mid- to late-1940s that filtered out to surrounding counties, however, we would expect that the effect to be largest in the central urban areas and smaller in the periphery. In fact, the results show that the measured effect of television is not significantly lower in the smallest, least dense, or least urban subsets of counties than in the sample as a whole.
per decade after it was introduced. Under the assumption that television had no further effect after 1970, aggregate off-year turnout would currently be 5.6 percent higher had television never been introduced, implying that television explains half of the total off-year decline in turnout since the 1950’s. The effect on presidential-year turnout is smaller and not significantly different from zero. The point estimates suggest that television accounts for roughly 24 percent of the decline in presidential years and that current turnout would be 3.1 percent higher had it never been introduced.

The second set of results shows that television reduced the level of political information in the population, and that this provides a plausible mechanism linking television and voting. It may seem surprising that an improvement in information technology would decrease information consumption. After all, television strictly increased the set of information sources consumers had available, and provided political news in a compelling visual form. A simple economic logic, however, can make sense of the negative effect. Television made available a whole range of new goods, from variety shows and televised sporting events to quiz shows and westerns. It thus changed not only the absolute quality-adjusted price of information, but also the relative prices of information and what we could broadly call entertainment. Consumers who had previously spent a significant fraction of their leisure time reading newspapers and listening to the radio now substituted much of this time to televised entertainment. The result was consumers who were less informed about politics.

A large body of theoretical and empirical evidence suggests that reduced information should in turn have made these consumers less likely to vote. In his classic formulation of the rational voting model, Downs (1957) argues that the difference voters perceive between two parties will be greater in expectation the more information they have about the election; this will in turn make them more likely to vote. The result that better information will be associated with higher turnout has also been shown in game theoretic models (Palfrey and Rosenthal 1985), strategic models with asymmetric information (Feddersen and Pesendorfer 1996; 1997; 1999), models with ambiguity aversion (Ghirardato and Katz 2000), and models where consumers receive direct “expressive” utility from the act of voting (Fiorina 1976; Gant 1983; Glaeser et al. 2004). Empirical evidence on this point is also compelling: a strong positive link between information and turnout has been demonstrated in regression analyses of survey data (Gant 1983), randomized field experiments (Gerber and Green 2000), and natural experiments (Lassen 2005).

I present three kinds of evidence documenting the crowding out of information and linking it to the turnout results. The first and more indirect approach is to look at the extent to which television caused substitution away from newspapers and radio. I confirm that television news provided less political information than either of these other media, and that the gap was larger for information about congressional races. I then use the variation in the timing of television’s introduction to show
that it caused a sharp reduction in newspaper circulation, and present anecdotal evidence suggesting that its effect on radio was equally dramatic. Finally, I use survey data from the 1952 National Election Study to show that respondents in areas with television reported getting significantly less information about the campaign from newspapers or radio (and, not surprisingly, getting more information from television.) The second approach is to look directly at measures of political knowledge using the National Election Study data. I construct two measures: the extent to which the respondent was able to name candidates running in the elections, and the number of free-response answers they gave to questions about the candidates and issues in the campaign. I find that the effect of television on all the information measures is negative, with the strongest and most significant effects for congressional elections. The third approach is to look for an exogenous variable that shifts the amount of information about local congressional races provided by television and ask whether this also changes the intensity of the turnout effect. The variable I consider is the number of congressional districts within a television market. The more districts a market is divided into, the more congressional races are taking place in a given election year, and the less local stations should be able to cover any one race. Although the results for the effect of districts on survey measures of information show no significant effects, the effect on turnout is exactly as predicted: having more districts increases the magnitude of television’s effect in off-year congressional elections but does not change the effect in presidential years.

The remainder of the paper proceeds as follows. The next section discusses the construction of the data. Sections 3 and 4 present background information on the history of television’s introduction and aggregate trends in information and turnout since 1950. Section 5 presents a detailed discussion of the paper’s identification strategy and the empirical specification, section 6 analyzes the effect of television on political information, and section 7 analyzes the effect on turnout. The final part of section 7 includes a discussion of both the robustness and the limitations of the results. Section 8 concludes.

2 Data

Central to this analysis is a new dataset on the availability of television in each US city between 1940 and 1970. This data was compiled from various issues of *Television Factbook* (Television Digest 1948-70), a yearly data book on the television industry used by advertisers, equipment manufacturers, station managers, and others. These books give a detailed profile of each station operating in each year, including its location, signal strength, network affiliation, ownership, and starting date.

A difficult issue in any analysis of television viewership is defining the geographic region reached by stations in a particular city. The current standard in the industry is a set of market definitions.
developed by Nielsen Media Research called Designated Market Areas (DMAs). They assign every county in the US to a television market such that all counties in a given market have a majority of their measured viewing hours on stations broadcasting from that market. These definitions are based on viewership as of 2003, rather than in the historical period I am analyzing. However, since the broadcasting strength of stations is regulated by the FCC to avoid interference with neighboring markets, the area reached by particular stations has not changed significantly. I therefore take the DMA definitions as a reasonable approximation of the viewing area of stations in the 1950’s and 60’s, and calculate the first year each county received television as the first year in which a station in the DMA broadcast for at least four months.

It is important to note two kinds of measurement error that will occur under this definition. First, I may code a county as having television because there is a station broadcasting in its DMA when in fact the county is too far from the station to receive its signals. My impression from working with the data is that this kind of error is extremely rare, limited to a few cases in large western DMAs. Second, I may code a county as not having television when its residents can in fact receive signals from stations in a neighboring DMA. This kind of error is more common. In particular, there are a number of smaller DMAs which consist of only one or two counties, defined as such because once the diffusion of stations was complete the majority of viewing in the county was from a local station. However, the entire DMA is sometimes well within the broadcast range of stations from a major city nearby, and contemporary accounts from the 1950’s suggest that television viewing was common even before the local station began broadcasting.

One way to get a sense of the magnitude of these errors is to compare the entry dates in my data to county-level television penetration data from the 1950 and 1960 censuses. This comparison is shown in figure 1. The 1950 census data reveals a clear distinction between counties that had a television station in their DMA and those which did not—the average penetration in DMAs whose first station began broadcasting before 1950 ranges from 8 percent in the 1949 group to over 35 percent in the 1941 group, while the average for groups getting television after 1950 never exceeds 1 percent. In the 1960 census data, by contrast, average penetration exceeds 60 percent for all groups including those whose DMAs did not have a television station in 1960. This is consistent with the observation that the last DMAs to get television were also the smallest and the most

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6 In a handful of cases, a county is split across multiple DMAs. (An example is El Dorado county in California. The eastern half of the county is assigned to the Reno DMA and the western half to the Sacramento DMA.) In these cases, I assign the entire county to the larger of the two DMAs. In the robustness section at the end of the paper, I show that dropping these counties does not meaningfully alter the results.

7 This has been verified by spot-checking the DMA definitions against coverage maps from the 1960’s.

8 In most cases, I use the date that a station began commercial broadcasts, as regulated by the FCC. The exceptions are two stations—KTLA in Los Angeles and WTTG in Washington, DC— that began large-scale experimental broadcasts and subsequently converted to become commercial stations. In these cases, I use the stations’ experimental start dates.
likely to be able to receive television from a neighboring city, and so the likelihood of the second
type of error in these counties is extremely high. In the remainder of the analysis, I will therefore
omit all counties in DMAs whose first television station began broadcasting in 1960 or later. This
applies to 13 out of 205 DMAs in my data accounting for .7 percent of the US population as of
1950. If these counties are included, the measured effects of television are attenuated as expected,
but remain statistically significant.

I combine the television data with county-level election returns compiled by the Inter-university
Consortium for Political and Social Research (ICPSR). The data give the total number of votes
cast for president and congress from 1840 to 1972, the distribution of the votes by party, and
estimates of the total votes as a percentage of the legally eligible electorate, as defined above by
contemporary citizenship, race, sex, and age criteria. This does not take account of other eligibility
criteria based on residency, or status as a convicted felon, for example. I use as my key dependent
measure the number of votes cast for congress as fraction of the eligible electorate. Rusk (2001)
provides a detailed discussion of the construction of historical turnout data, including possible
errors in the ICPSR data. These data remain the only available time-series disaggregated to the
county level, however. Not all counties have data for all years, and a small number of counties
changed their borders or merged during the period of interest (see Rusk 2001 for details on when
counties are omitted.) I adopt the rule that counties are included if they have congressional turnout
data available for a majority of the election years from 1940-1972. I also drop eleven counties that
could not be matched to the census. This leaves a total of 3,081 counties in the final dataset.
In the main analysis I use the unbalanced panel, dropping county-year pairs with missing data. I
check in the robustness section that the results are unaffected if I use the balanced panel with only
counties that have data for all years.

As mentioned above, I look at differential effects on local elections by comparing the effect
of television on this variable in presidential and off-year elections. Congressional races are the
most local contests for which long county-level time series on turnout are available. Since each race
involves only a single congressional district, and the median television market contained between
three and four such districts in the period under study, coverage on television was limited. There

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9 The study is entitled "Electoral data for counties in the United States: Presidential and congressional races, 1840-1972," and is ICPSR study number 8611.
10 This is the standard measure of turnout, and is considered superior to the measure with number of registered voters in the denominator. According to Prysby (1987): “Calculating turnout as a proportion of registered voters... is generally inappropriate in the American context, given the large numbers of people who are eligible to register but fail to do so. In fact, the available research indicates that most nonvoters are not registered” (113).
11 The original ICPSR dataset has 3393 counties. 208 of these were counties that no longer exist, all but three of which merged with other counties in the nineteenth century. 302 counties are missing congressional turnout data from at least 8 of the 17 election years between 1940 and 1972. Subtracting the ten counties that failed to match to census data leaves 3081 counties.
12 The differences in coverage are documented in detail below.
are two ways one could measure the gap between presidential and congressional turnout. The first is to compare the number of votes cast for president and the number of votes cast for congress in a year in which both races are taking place. This is referred to in the political science literature as “roll-off.” The second is to compare the number of votes cast for congress in years with a presidential race and years without. This second is referred to as “drop-off.” Because voters who have already paid the fixed costs of going to the polls tend to vote in most races, the latter is usually four to five times larger than the former. It is also the quantity that is most directly related to the theories of turnout described above, since most of these incorporate some cost of voting, and the cost of casting an additional vote once one is already standing in front of a ballot is effectively zero. I will therefore focus on drop-off. The results for roll-off are weaker, and are discussed in the section on robustness and limitations at the end of the paper.

To assess political knowledge and the use of media for political information, I also match the television data to the 1952 National Election Study.\textsuperscript{13} This is a nationally representative sample of 1,899 voting-age citizens interviewed both before and after the 1952 election. The timing of this election is ideal, because it was the last year of the FCC freeze and so maximizes the idiosyncratic variation in television access. The survey included detailed questions on political attitudes, voting behavior, and demographics, as well as limited information on media use. It also identifies the county of residence of each respondent.

For newspaper circulation, I compile a state-level dataset using various issues of \textit{Editor and Publisher Yearbook} (Editor and Publisher 1946-1971), which give the total circulation of daily newspapers for each state in each year. I translate these into circulation per capita using census population data. County and city-level demographics are obtained from the decennial census, with inter-census years estimated by linear interpolation.

\section{The introduction and growth of television}

Television technology was already well developed by the late 1930's. The first workable prototypes for television receivers were made in the early 1920s, the first public demonstration took place in 1923, and numerous experimental broadcasts were made in the late 1920's. By 1931, 18 experimental stations were operating in four cities. The first television sets went on sale in 1938–an estimated 4,000 people flooded the store on the first day they were available–and by 1939 14 companies were offering sets for sale.\textsuperscript{14} After several delays, the Federal Communications Commission (FCC) finally licensed television for full-scale commercial broadcasting on July 1, 1941.

\textsuperscript{13}The study is entitled "American National Election Study, 1952," and is ICPSR study number 7213.
\textsuperscript{14}This section draws primarily on Sterling and Kittross (2001) and Barnouw (1990). For details on the regulatory process, see also Slotten (2000).
Although television seemed poised for rapid growth at this point, two events intervened to delay the process. The first was World War II: less than a year after the FCC authorization, the government issued a ban on new television station construction to preserve materials for the war effort. Although existing stations continued to broadcast, the total number of sets in use during the war was less than 20,000. After the war, television grew rapidly. Over 100 new licenses were issued between 1946 and 1948, so that by 1950 half of the country’s population was reached by television signals. This growth was again halted, however, by an FCC-imposed freeze on new television licenses in September 1948. The FCC had determined that spectrum allocations did not leave sufficient space between adjacent markets, causing excessive interference. The process of redesigning the spectrum allocation took five years, and it was not until April 1952 that the FCC lifted the freeze and began issuing new licenses.

To justify the empirical analysis that follows, it is important to establish that the diffusion of television was rapid enough that its effects could be felt within a relatively short window of time. One point to note is that many aspects of the television industry—from the format of newscasts, to the structure of the networks—had been developed and perfected by the radio industry. Furthermore, as described above, the technical and logistical aspects of television had been largely worked out well before the end of the war. A number of technological innovations during the war years, including better cameras and a technology for re-broadcasting cinema film, further improved quality. As Barnouw (1990) writes, the prospects for television’s growth after the war were “explosive”:

Electronic assembly lines, freed from production of electronic war materiel, were ready to turn out picture tubes and television sets. Consumers, long confronted by wartime shortages and rationing, had accumulated savings and were ready to buy. Manufacturers of many kinds, ready to switch from armaments back to consumer goods, were eager to advertise (99).

We can look at the pattern of television’s growth in a number of different ways. Some evidence was already presented in figure 1, which showed substantial diffusion of television ownership by 1950 (13 percent on average in markets that had television, and over 30 percent in the largest markets.) Figure 2 shows the time path of diffusion. In the largest counties, 20 percent had televisions by 1950, and 80 percent had televisions by 1955. Figure 3 draws on data from Nielsen audience surveys, and shows that in those households with television, viewership had already surpassed four and a half hours per day by 1950. Figure 4 shows the number of commercial stations broadcasting: the post-war expansion, freeze, and subsequent takeoff are clearly visible.

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15 I consider a county to be reached by television if it is in a Nielsen Designated Market Area that had at least one station by 1950.
Taken together, these figures show that the most dramatic period of growth in stations and ownership occurred between 1950 and 1960. After 1960, growth continued on other dimensions. Although the number of households with televisions had plateaued, the number with multiple sets more than tripled between 1960 and 1970 (Sterling 1984, 236). Color television was introduced at the end of the 1950’s, and the fraction of television households with color sets increased from less than one percent in 1960 to more than 50 percent in 1972 (Television Digest 2001). The combined effect of these changes is reflected in the number of viewing hours per household, which increased from four and a half hours in 1950, to just over five hours in 1960, to more than six hours by 1975.

While the analysis in this paper does not extend beyond 1970, it is worth examining briefly how television has changed since then. If the scale of television continued to increase, the long-run effects could be even greater than those documented here. On the other hand, if television began providing substantially more political information, some of the effects could actually be reversed. In reality, the former seems more likely than the latter. The time devoted to television viewing continued to increase steadily until the mid 1980’s, with daily viewership in 1995 50 percent higher than in 1965 (Robinson and Godbey 1999). The number of sets per household increased from 1.4 to 2.3 between 1970 and 1995 (Putnam 2000), and both color television and cable saw the majority of their growth after 1970 (Television Digest 2001). Furthermore, although the supply of news on television has clearly grown,\textsuperscript{16} entertainment options have proliferated as well, and there is little evidence that people were getting more political information from television in the late 1990’s than they were in 1970.\textsuperscript{17} Looking at local news in particular, the evidence suggests that viewership remained constant or even fell.\textsuperscript{18}

A final way to look at the speed with which television’s impact was felt is to consider anecdotal reports from the period. In June 1951, the New York Times ran a series of six articles on the perceived effects of television (Gould 1951a-f). This was the middle of the FCC freeze, and there were large numbers of cities both with and without television. The paper surveyed its correspondents in 100 cities of both types and compared their responses.

\textsuperscript{16}The introduction of cable news was the most significant change. The amount of local news available also increased, from 30-60 minutes per day in the 1970’s to more than two hours per day by the late 1990’s (Sterling and Kittross 2001).

\textsuperscript{17}The fraction of respondents in the National Election Study who said they had watched programs about the presidential campaign on television was lower in all but one year of 1980-2000 than in \textit{any} year between 1960 and 1972. Network evening news viewership was flat from 1970-1980 and then declined by more than 50 percent between 1980 and 2000 (Nielsen Media Research 2003). Some of the decline in the 1980’s may have been offset by growing cable news viewership, but this does not appear to be true of the 1990’s, as the fraction of people saying they watch CNN “regularly” or “sometimes” was not substantially higher in 2000 than in 1990 .

\textsuperscript{18}In 1972 and 1996, National Election Study respondents were asked how often they watched local newscasts. The questions were different in the two years, so are not directly comparable, but they do not show evidence of a large increase: 10 percent said they “never” watched local news in 1972 and another 8 percent said they watched “rarely”; in 1996, 15 percent said they had not watched at all in the last week and 5 percent said they had watched only one day. Furthermore, the fraction of people who say they “frequently” watch the local news fell from 76 percent in 1993 to 56 percent in 2000 (Pew Research Center 2002).
The results showed a wide range of changes in the television cities: “Television, in commercial use for only a little more than five years, is influencing the social and economic habits of the nation to a degree unparalleled since the advent of the automobile” (1951a). Evening radio listening, business at night clubs and bars, and taxicab receipts were all reported down (1951d). Movie attendance was said to have fallen by 20 to 40 percent (1951a). High schools and colleges suffered from falling attendance at sporting events, with “loss of revenue from football and basketball threatening other sports” (1951c). Politicians predicted the “demise of the political rally” (1951b), and “schedules of civic and community meetings [were] altered to avoid competition with video’s stars” (1951d). While all of these observations are anecdotal, they document a contemporary perception that television had caused significant social change in the course of only a few years.

4 Aggregate trends in information and turnout

Long time series on the information voters have about politics are unfortunately few and far between. The consensus based on what information does exist, however, is that voters are either less informed or no better informed today than they were fifty years ago. The most comprehensive analysis is provided by Delli Carpini and Keeter (1996). They compile 227 questions about factual political information that have been asked at least twice on surveys since the 1940s. The subjects range from the name of current senators or representatives to the meaning of various constitutional amendments to the length of a presidential term. While knowledge on some items has declined and others has improved the authors conclude that the overall level of knowledge has remained unchanged. Other studies concluding that information has either been flat or declining include Neuman et al. (1992), Bennett (1988; 1989), and Smith (1989). Jennings (1996) uses panel data in which the same set of factual questions were asked repeatedly between 1965 and 1981. The results are mixed, with some evidence of higher levels of information among younger generations but no evidence of changing information levels within cohorts over time.

The broad trends in voter turnout are shown in figures 5 and 6, which plot turnout in House elections for the years 1916-1998. Figure 5 shows turnout in presidential years, and figure 6 in non-presidential years. Although turnout has been volatile over the century, the graphs clearly show a marked decline since 1960. It is steepest in the years 1960-1974 and flattens out significantly thereafter. Because there was substantial remobilization of black voters in the south during this period, the decline outside the south was even more pronounced. Non-south presidential turnout fell by almost twenty points between 1960 and 1996, and the 1996 turnout rate was the lowest in a presidential election since 1824.

Several events that affected turnout over the century are worth noting. First, the Nineteenth Amendment was ratified in 1920, extending the franchise to women. This has frequently been cited
as a reason for the drop in presidential turnout in the 1920 and 1924 elections as it took several years for voting rates among women to reach near-parity with those of men (Rusk 2001). Second, there was a sharp drop in turnout during and immediately following World War II. I have not seen a convincing analysis of what caused this drop, but I would speculate that it could result from sharply reduced participation among military personnel stationed overseas. Third, the Twenty-Sixth Amendment passed in 1971 required that all states extend the franchise to 18-21-year-olds, a group that historically has significantly lower turnout rates than older voters. Kleppner (1982, 123) estimates that approximately 25 percent of the drop in turnout between 1968 and 1972 can be attributed to the expanding electorate.

A large literature in political science has sought to explain the post-1960 decline in turnout. Mainly drawing on regression analysis of cross-sectional surveys, this literature has identified three changes that seem most strongly correlated with declining turnout: weakening loyalty to political parties, less belief that government is responsive to voters’ concerns, and decreasing participation in local communities and institutions more broadly.\textsuperscript{19} Clearly, inferring causation from such regressions is problematic. They also leave open the question of why such political attitudes themselves changed so dramatically. Also, Cassel and Luskin (1988) note that the magnitude and significance of the coefficients in these regressions is highly sensitive to what other variables are included as controls. They conclude that “most of the post-1960 decline in turnout is still unexplained.”

The majority of studies in the political science literature that have looked at the specific link between media and voting have failed to find strong effects. Graber (2002) writes: “The findings that media effects were minimal were so pervasive in early research that after an initial flurry in the 1940s and 1950s, social science research into mass media effects fell to a low ebb. In study after study dealing with political socialization and learning, the mass media were hardly mentioned as an important factor” (10).\textsuperscript{20} Effects of media have been found in other domains, for example the way campaigns are conducted and financed and the agenda of public debate (Graber 2000). Also, an interesting recent study by Prior (2004) uses data on television in the 1950s to show that television increased the advantage of incumbents. He also uses later National Elections Studies to look at the effect of television on information. He finds that the number of television stations is positively correlated with knowledge, especially among the least educated respondents. This is an

\textsuperscript{19}Book-length works include Kleppner (1982), Teixeira (1992), and Piven and Cloward (2000). Explanations for the turnout decline are also summarized by Aldrich and Simon (1986), and developed in Reiter (1979), Cassel and Hill (1981), Shaffer (1981), and Abramson and Aldrich (1982). For the role of declining community participation, see Olsen (1972) and Cassel (1999).

\textsuperscript{20}One older study of particular interest is Simon and Stern (1955) who use a methodology similar to the one I use here. They compare turnout in counties that had television in 1952 to those that were denied it due to the FCC licensing freeze. Unfortunately, computational and data limitations mean they are only able to look at counties in the state of Iowa, and they do not find any significant results. Nevertheless, their paper contains a good argument for the way the freeze could function as a natural experiment to identify television’s effects. See also Glaser (1965).
interesting contrast to the findings of this study, and suggests that understanding heterogeneity in
the television effect across different kinds of voters is an important area for future research.

A number of recent studies of turnout by economists have found provocative results linking
media and turnout. George and Waldfogel (2002) show that in cities where circulation of the New
York Times grew during the 1990’s, voter turnout among educated voters fell, with a particularly
strong effect in off-year elections. The differential between the two kinds of elections is consistent
with the results of this study, and the authors argue that it may be driven by a similar substitution
mechanism to the one I argue for here. Oberholzer-Gee and Waldfogel (2001) show that minority
turnout is higher in counties with larger minority populations, and attribute the difference
to the ability of minority-targeted media to deliver campaign messages.

Stromberg (2004) presents evidence that penetration of radio in the New Deal period increased
turnout in gubernatorial elections, an interesting finding that contrasts with the effect of television
documented here. One possible explanation is that technological features of radio (for example, the
fact that it is possible to read and listen at the same time) meant that it caused less substitution
away from newspapers. This is certainly consistent with aggregate trends in newspaper circulation
per capita which show a sharp downward trend beginning when television was introduced but no
similar downward trend for newspapers.\textsuperscript{21} Radio also had more political coverage than television,
and may have represented a substantial improvement in the availability of information, especially
in rural areas.

5 Identification and empirical specification

Although television is widely believed to have large effects on social outcomes ranging from politics
to crime to education, identifying its causal effect has proven to be a difficult challenge. The
most common research design uses cross-sectional data with the key right-hand side variable being
hours of television viewing or number of television stations. These analyses suffer from potentially
severe bias caused by the correlation of the television measures with unobserved characteristics of
individuals or localities. Panel-data designs using variation over time in the number of stations
(or more ambitiously the availability or price of cable) could potentially address some of this bias.
However, the impact of the marginal station or cable subscriber on aggregate viewing patterns is
likely to be very small, making it difficult to detect effects in small samples.

The key innovation of this study is to use panel data from a period in which the variation
over time in television’s availability was far from marginal. As already described, many counties
went from having essentially no television viewing to having 80 percent of households watching
an average of 4.5 hours per day in as little as 5 years. Furthermore, the last significant group of

\textsuperscript{21} Aggregate circulation per capita is shown in figure 10, discussed in more detail below.
counties to receive television got it a full 10 years after the post-war growth of television began in the largest cities. This suggests a research design which is essentially differences-in-differences, asking whether changes in political information or voter turnout were correlated with the timing of television’s introduction.

Two key features of the data allow me to strengthen this basic identification strategy. The first is the fact that both World War II and the FCC freeze were exogenous shocks to the pattern of television’s introduction across markets. The second is the fact that individual television stations broadcast over a large area, reaching a heterogeneous group of counties.

To examine the first of these, figure 7 shows the fraction of the US population in counties receiving television for the first time in each year. Three distinct groupings are clearly visible: counties that had television before the war, starting in 1940; counties that got television between 1945 and 1951, with the bulk in 1948 and 1949; and counties that got their first station after the freeze, beginning in 1952. The gaps between these three groups are presumably much greater than they would have been had exogenous events not intervened, and this added variation adds greatly to the power of the data to identify television’s effect.

While the war and the freeze changed the timing of television’s introduction across markets, they did not necessarily change the ordering. Predictably, it was in the largest and wealthiest television markets that potential entrants found it profitable to apply for licenses and begin broadcasting in the earliest years. Table 1 shows county-level demographics for the three major groupings of counties: counties that got television earlier were larger, more urban, with higher income, median age, and schooling; the earliest group also had substantially higher turnout in the 1940 election. Although the panel design controls for both cross-sectional differences correlated with the timing of television’s introduction and common changes over time, the results could still be biased if there were negative shocks to information or voting that hit the largest and richest cities in the mid-1940’s, medium-sized cities in the late-1940’s, and small cities and rural areas in the early-1950’s.

One way to address this issue is to make use of observable county characteristics. Note, for example, that the largest differences in observables shown in table 1 are between the first two groups; the only large differences between the 1945-51 and post-freeze groups are in population, population density, and percent urban. This suggests that spurious correlation is likely to be less of a problem if attention is restricted to the latter groups.\textsuperscript{22} Furthermore, a simple regression analysis confirms that market size and income were the key determinants of the timing of television’s introduction. A linear regression at the DMA level of the year television was introduced on log population and log total income yields an R-squared of .69. When the residuals from this regression are in turn regressed on percent urban, percent high school, median age, percent non-white, population density,

\textsuperscript{22}In the robustness section at the end of the paper, I show that the results are robust to using only these groups.
median income, and 1940 turnout, the coefficients are neither individually nor jointly significant at
the 10 percent level. The largest individual t-statistics are on percent urban, percent non-white, and
population density (-1.46, -1.17, and -1.04 respectively). This suggests that controls for population
and income may eliminate much of the spurious correlation.

An even more powerful way to address this issue, however, is to exploit the large and heteroge-
neous broadcast area of individual television stations. Consider figure 8 which shows a map of the
Chicago DMA and the characteristics of the counties that compose it. As discussed above, this is
the area within which a majority of television viewing is on stations based in Chicago. Although
Chicago was the second largest television market in 1950 and the DMA as a whole is highly urban,
dense, and wealthy, the counties that compose it cover a broad spectrum of characteristics. They
range from Newton County, IN, which has no urban population, a density of 27 people per square
mile, and a median income (in 1950 dollars) of $2,778, to Cook County, IL, which has 99 percent
urban population, a density of 4726 people per square mile, and a median income of $4,085. If as
suggested above there were bias in the basic panel specification caused by shocks to voting in dense
urban areas in the mid-1940’s, this should show up in the voting patterns of Cook County but not
Newton County. This suggests that a robust way to identify television’s effect would be to compare
counties that are similar on dimensions like density and percent urban (taking only rural counties
like Newton, for example) and ask whether they saw changes in voting around the time television
was introduced. The variation in the timing of television would then be driven by whether a county
happened to fall within the roughly 100-mile radius of television broadcasts from a large city, with
the identifying assumption being that proximity at this distance is uncorrelated with unobserved
shocks that changed the level of turnout over time.

The basic framework for the analysis is a fixed effects regression of the form:

\[ Y_{it} = \mu TV_{it} + \alpha_i + \gamma_{rt} + CONTROLS_{it} + \epsilon_{it}, \]  

where \( i \) indexes counties, \( t \) indexes years, and \( r \) indexes census regions. \( Y_{it} \) is an outcome measure
of interest, \( \alpha_i \) and \( \gamma_{rt} \) are location and region-time fixed effects respectively, and \( \epsilon_{it} \) is a random
shock. \( TV_{it} \) is some measure of the scale of television in county \( i \) and time \( t \). \( CONTROLS_{it} \) includes
observable county characteristics (that change over time) and other functions of these characteristics
described below. I also include in all specifications the absolute difference of the Republican and
Democratic vote percentages, a competitiveness measure that has been shown to have a strong
effect on turnout (see Stromberg 2004).

To implement the identification from county heterogeneity just described, I use two approaches.
The first is to include in \( CONTROLS_{it} \) interactions between key county-level observables and a
fourth-order polynomial in time. This controls flexibly for differences in the time path of the depen-
dent variables whose correlation with television is driven by the endogenous pattern of television’s introduction. Based on the analysis of this timing described above, I include interactions with log population, log income, and turnout in the 1940 election. The latter is not significantly related to the year television was introduced once population and income are controlled for, but since any residual correlation could lead to severe bias it seems safest to include it. I also check that the results are robust to including interactions with percent urban, population density, and percent non-white, the remaining characteristics with t-statistics greater than one in the timing regression. The second approach is to partition the counties into thirds along observable dimensions and run the analysis separately for each group. This is a more flexible specification in that it allows the region-time dummies to be estimated separately for each group. It is also a literal implementation of the experiment described above—comparing similar counties that differ in the timing of television because of their proximity to large cities.23

The remaining issue is how to model the effect of television. There are several reasons to expect that its impact would not be a one-time discontinuous change, but would rather grow gradually over time. First, the quantity and quality of programming increased steadily following television’s initial introduction. Second, television ownership diffused slowly across households. Finally, the process by which television is linked to voting—substitution among media leading to a depreciating stock of information and ultimately to reduced participation in elections—would be expected to take effect gradually over time.

A natural starting point, then, would be to allow $TV_{it}$ to grow linearly over time, beginning in the year when the first station starts broadcasting in county $i$. That is, $TV_{it} = I(t \geq \tau_i)(t - \tau_i)$, where $\tau_i$ is the year television is introduced and $I()$ is the indicator function. Because penetration of television was negligible before the end of World War II, I assign a first television year or 1946 to all counties that had stations before that date. I also include separate trends for presidential and off-year elections.

These specifications impose the assumption that a single television station has the same effect regardless of where or when it is introduced. This is unrealistic for several reasons. First, the rate of television adoption by households should vary with demographic characteristics of counties. High income consumers, for example, would be expected to purchase televisions sooner. Second,

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23 A different way to exploit the same variation in the data would be to use a matching algorithm. As a robustness check, I have estimated the effect of television using the nearest-neighbor matching algorithm of Abadie and Imbens (2004). I define a binary treatment variable equal to one if a county received television before the end of the FCC freeze (1952), and two dependent variables: the change in turnout between the presidential elections of 1944 and 1952; and the change in turnout between the off-year elections of 1946 and 1954. I match counties based on 1960 log population and log per capita income and 1950 median age, population density, percent urban, percent non-white, percent with high-school diploma, and median income. I consider specifications with and without bias correction, with between one and four matched observations, and with heteroscedasticity-corrected standard errors. The sample average treatment effect of television is significant at the .1 percent level in all specifications, and roughly 50 percent larger for off-year turnout than for presidential-year turnout.
the elasticity of voting with respect to information could be different in different locations if characteristics such as education and income predict whether or not particular consumers are close to the margin in their turnout decision. Finally, several crucial variables are changing over time: the quality of television sets, the broadcasting technology, and the programming broadcast on the national networks. Introducing a station in a given county in 1946 could have a very different effect than introducing it in the same county in 1956. The effect might be larger, if higher quality leads more consumers to more adoption and more hours of viewing in 1956. It could also be smaller if the relative quality and quantity of political coverage was higher in 1956.

I will capture these effects by expanding the linear specification of $TV_{it}$ to include interactions of the number of years of television (i.e. the $I(t \geq \tau_i)(t - \tau_i)$ term) with observable county characteristics, proxies for the rate of television diffusion and voting elasticity, and the actual year in which television was introduced. I will also introduce non-linearity to the television effect by allowing both a linear and a quadratic trend.

Finally, in specifications using the National Election Study data, the variation is only cross-sectional and so I cannot include the $\alpha_t$ and $\gamma_{rt}$ terms in equation 1. On the other hand, this data is at the individual level so I am able to include in CONTROLS a much longer list of individual, county, and DMA-level characteristics.

To further check the validity of the identification strategy, table 2 presents results from a series of placebo regressions. The goal is to test whether once the effect of the key observables is partialed out, variation in the timing of television’s introduction is orthogonal to the remaining observables. The timing of television is measured by a dummy equal to one if a county received their first station after the FCC freeze.\textsuperscript{24} Column one of the table displays the F-statistic for the null hypothesis that the coefficients on the remaining observables are all equal to zero. Column two shows the number of the coefficients that are individually significant at the 5 percent level.

The first set of tests look at whether the timing of television is orthogonal to the full vector of observables once we restrict attention to subsets of counties. The F-statistics here are from a simple regression of the post-freeze dummy on the eight demographics shown in table 1 and region dummies.\textsuperscript{25} For the lowest third of counties by population, income per capita, and 1940 turnout, the hypothesis that the demographic coefficients are jointly significant cannot be rejected. It is rejected at the 5 percent level for the lowest third by density and percent with high school education, and at the 1 percent level for the lowest third by percent urban. In no case is more than one demographic coefficient individually significant. This evidence suggests that the strategy of

\textsuperscript{24}An alternative is to use the year television was introduced as the left-hand variable. In this case, the F-statistic for the lowest third by population density is no longer significant, while the F-statistic for the whole sample regression becomes significant at the one percent level.

\textsuperscript{25}Because the subset regressions below allow a different set of time dummies by region, the region dummies are treated as incidental controls here and not included in the F-test.
looking at subsets of counties removes much, but possibly not all, of the correlation between the
timing of television and county characteristics.

The next test looks at whether the timing of television is orthogonal to observables in the full
sample once we control for population, income, 1940 turnout, and region dummies (these are the
variables that are interacted with a time polynomial in the main specification). In a regression of
these residuals on the remaining demographics the demographics are neither jointly nor individually
significant, confirming that the remaining variation is largely idiosyncratic.

The final test looks at the orthogonality of television in the National Election Study sample.
Here, the data is at the individual level and the dependent variable is a dummy equal to one if the
respondent’s county had television in 1952. The specification tests whether individual respondent
characteristics predict having television once region dummies and county-level population, income,
and percent non-white are controlled for.26 The twenty-eight right-hand variables are neither jointly
nor individually significant, again confirming that the remaining variation in timing is idiosyncratic.

6 Did television affect turnout?

6.1 Relative trends

As a first step in analyzing the effect of television on turnout, I present direct comparisons of turnout
in counties divided into three groups by the year their first television station began broadcasting.
This is a coarser approach than will be possible with the fixed effects model of equation 1, but has
the advantage of allowing one to look at the data directly.

As was clear from figure 7, the natural groups are pre-1945, 1945-51, and 1952 and after. If
television reduced voter turnout, we would expect the first two groups to show a negative trend
relative to the third group in the years up to 1952. The relative decline should begin in 1946 for the
first group (recall that television did not begin to diffuse widely until after the war), and sometime
between 1946 and 1948 for the second group.

Figure 9 shows turnout in the first and second groups respectively, measured relative to the
third. To construct the figure, I regress county-level turnout on year-region dummies (I take out
separate time effects by region to control for the exogenous changes affecting turnout in the south.)
I then calculate the mean of the residuals for each group in each year. The first panel plots the
mean of the third group residuals minus the mean of the first. The second panel plots the mean of
the second group residuals minus the mean of the first.

A clear relative decline is apparent for both groups, beginning in 1946. That the negative
trend is slightly larger for the first group is consistent with the early areas having relatively high

26 These county-level controls are included in all National Election Study regressions.
income and density and thus being the places where television ownership diffused the fastest (a point which is examined more rigorously when I add interaction terms to the regression analysis.) For the first group, the relative trend also clearly flattens out beginning in 1954, the year that most counties in the reference group first had television. No clear flattening is visible for the second group. One could also note that relative turnout in the first group declines steeply between 1944 and 1946, whereas it does not decline steeply in the second group until 1946-48. This is consistent with expectations given the timing of television’s introduction to these groups, though it may be reading too much into the details of the data.

Table 3 provides a more detailed look at these trends in a regression framework. The specification for these regressions is equation 1 with $Y_{it}$ equal to county-level congressional turnout. $TV_{it}$ is specified as four separate terms: an interaction of a dummy for membership in the first group and a time trend for the years 1944-1950; an interaction of the first group dummy and a trend for 1952+; an interaction of a second group dummy and a trend for 1946-1950; and an interaction of a second group dummy and a trend for 1952+. Observe that in the simple model where all counties have an identical linear television effect, the coefficients would be negative on the 1944-1950 and 1946-1950 terms, and zero for 1952+ (since after 1952 all counties would have television and it would cause no relative change in turnout.) If the effect were larger in the first or second group, we would expect the 1952+ coefficient to be negative but smaller. If the television effect were non-linear, becoming smaller over time, this coefficient could be positive.

The three columns of table 3 repeat the same regression, adding progressively more controls. The first exactly duplicates what was shown in figure 9, including only county and year-region fixed effects. The second adds interactions of county log population, log income, and 1940 turnout with a fourth-order polynomial in time. The third adds levels of the key demographics: log population, population per square mile, percent urban, percent non-white, median income, median age, and percent with high-school education. The results in all three columns show that turnout in both the first and the second groups declined significantly relative to the third in the years after they got television. The magnitude of this trend falls somewhat when the time polynomial interactions are added; adding the levels of demographics causes the coefficient for the first group to fall slightly and the coefficient for the second group to increase slightly. In the final specification, adding television caused a trend in turnout of -.399 percentage points per year in counties from the first group and -.106 percentage points per year in the second group, both significant at the one percent level. The results also show that once the polynomial interaction controls are included, there is no significant relative trend in either group after 1952 (the period when the third group also had television). This

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27 To see why these are the relevant periods, note that the first change in turnout which should have been affected by television is 1944-1946 in the first group and 1946-1948 in the second group. The first change which could have been affected by television being introduced to the third group is 1952-54.
suggests that the continuing decline in turnout in the first two groups of counties after 1952 was roughly equivalent to the decline in taking place in the third group.

6.2 Years of television regressions

Table 4 presents what I consider to be the core set of regressions in this section. These are again based on equation 1 but differ from the relative trends regression in that rather than using a coarse division of counties into three groups and looking at the first two groups relative to the third, the $TV_{it}$ variable is defined as a separate trend for each county beginning in the year it first received television. That is, $TV_{it} = I(t \geq \tau_i)(t - \tau_i)$, where $\tau_i$ is the year television was introduced in county $i$ and $I()$ is the indicator function. The first three columns show the coefficients on this variable in specifications with county and region-year dummies alone, with the time polynomial interactions, and with both these interactions and demographics. The results show that television caused a significant decline in voter turnout. The magnitude of this effect drops significantly when time polynomial interactions are added, and falls slightly when demographics are included as well. In the complete specification, introducing television causes turnout to fall by .136 percentage points per year.

The next three columns repeat these specifications allowing different trends for presidential and off-year congressional elections. Recall that one of the key predictions discussed above is that the television effect should be larger for off-year elections. The results show that this is indeed the case. The off-year coefficient is significantly negative in all specifications and suggests that television reduced turnout by .196 percentage points per year. For presidential years, on the other hand, the coefficient is significantly negative in the simplest specification, but it is only marginally significant once polynomial interactions are included and is insignificant with the full set of controls. In the complete specification, the point estimate is a negative effect of .067 percentage points per year. The final three columns add additional interactions between the time polynomial and percent urban, population density, and percent non-white respectively. These were the three characteristics, after those already included in the interactions, that had the highest t-statistics in the DMA-level regression of television’s timing on demographics (though none were significant). The results do not change substantially when these interactions are included, suggesting that the remaining variation identifying the television coefficient is largely idiosyncratic.

The results presented so far cast doubt on the hypothesis that the apparent effect of television is driven by spurious correlation with some unrelated shock to voting. The effect remains strong and significant in a variety of specifications even after allowing interactions between a flexible function of time and all of the major correlates of the timing of television’s introduction. This means in particular that any factor influencing voting whose correlation with television was driven by city
size or income—for example, a social change that began in the largest cities in the 1940’s and then diffused outward—would not bias the coefficients.

It is possible to perform an even stronger check on the validity of the results. As discussed earlier, a more direct way to exploit the fact that television stations broadcast to a heterogeneous group of counties is to perform the analysis using only those that are demographically similar—for example, comparing turnout patterns in rural counties that happened to get television early because of proximity to a large city and those that got television late. In table 5, I divide counties into thirds by different observable characteristics and then perform the analysis separately on each third. The table reports the coefficient on years of television from a regression of turnout on this variable, county dummies, and separate year dummies by region (as well as the usual competitiveness measure). The first column of the first row, for example, reports this coefficient using only the smallest counties.

The results provide further evidence that the estimates represent a causal effect of television. The television coefficient remains significant in all but one of the eighteen specifications, and has the correct sign in all of them. The magnitude does not vary in a systematic way across thirds by population or percent urban, and is actually largest in the least dense counties, providing strong evidence against the hypothesis that the results are driven by changes taking place in the largest cities. (Note that even if there were shocks to large cities that reverberated throughout the broader television markets, we would expect the coefficients to be smaller for the less urban counties.) On the other hand, the magnitude is higher in quartiles with higher levels of income and education, consistent with the expectation that these would be the counties where television diffused the fastest. Finally, the effect is larger for counties whose turnout at the beginning of the period was highest. One interpretation is that the voting population in these counties in 1940 included a large number of relatively marginal voters whose turnout was more affected by the introduction of television.

6.3 Interactions and non-linear effects

The next step in the analysis is to look in more detail at the way the magnitude of the television effect varies with county characteristics. The most obvious reason that the effect might differ is because television ownership (and in later years multiple set and color ownership) diffused faster and more broadly in some places than others. The picture is more complicated, however, because we would also expect the sensitivity of turnout to a given change in information consumption to vary with demographics. Suppose, for example, that wealthier or more educated individuals have high levels of information regardless of media consumption, or that they have a strong sense of duty as citizens. Then they would tend to be further away from the turnout margin, and less affected
by the introduction of television.

To structure the analysis of the interactions, I therefore begin by looking at the variation in diffusion and turnout sensitivity directly. These results are presented in table 6. The first column presents coefficients from a regression of 1960 television penetration on demographics and dummy variables for the year in which television was introduced. They show that income, education, and age are all positively related to rate of diffusion, while percent urban, density, and percent non-white are negatively related. The second column measures the sensitivity of turnout to exogenous changes by asking how sensitivity to the closeness of elections varies across counties. Although there is no reason to expect the reaction to variation in election closeness would be identical to the reaction to information, we would expect that counties that had a large number of marginal voters would respond more to both. The coefficients shown are interactions between the given characteristics and the absolute difference in vote shares in a regression whose dependent variable is turnout. Importantly, county turnout in 1940 is allowed to affect sensitivity but not diffusion—this is based on the assumption that unusually high turnout may reflect the participation of a large block of marginal voters but should not directly affect television set purchases. The results show that election closeness has the largest (negative) effect in counties that are smaller, poorer, less educated, urban, and dense. The effect is also largest in counties with high 1940 turnout. Note that these results imply a strong negative correlation between television diffusion and turnout sensitivity.

Table 7 presents turnout regressions that allow a heterogeneous effect of television. The first column includes interactions with the full set of county demographics. The negative trend introduced by television is larger in counties with low population, high income, low education, high percent non-white, high density, and high 1940 turnout. These results are hard to interpret, however, because they may conflate differences in the diffusion of television and the fraction of marginal voters. The next three columns therefore include interactions between years of television and linear combinations of the demographics suggested by the regressions in table 6. Column 2 includes an interaction with predicted television penetration in 1960 and shows that the television effect is largest in those counties where ownership diffused the fastest. The effect is large, with a one standard deviation increase in diffusion more than doubling the television effect. Column 3 includes an interaction with the predicted sensitivity of turnout (that is, the coefficient on election closeness as a function of demographics) and shows that the television effect is largest where the fraction of marginal voters is highest. A one standard deviation increase in this variable increases the television effect by approximately 60 percent. Column 4 includes both the diffusion and sensitivity measures. The magnitude of the former falls slightly and the magnitude of the latter increases slightly. Both remain highly significant. Column 5 adds an interaction with the year television was introduced. Recall that in the analysis of relative trends at the beginning of this section the television effect
was substantially larger in the earliest counties. In this regression, by contrast, the interaction with year of television is small and insignificant, and actually predicts a larger effect for later counties as we would expect if the quality of entertainment programming improved over time. The difference observed earlier was therefore driven by the fact that earlier counties had higher levels of diffusion and turnout sensitivity.

The last three columns of table 7 address the question of how the effect of television changes over time by including both years of television and years of television squared. One weakness of a research design that relies on relative changes between counties over time is that such non-linearities will be difficult to separate from heterogeneity across counties. Recall, for example, that the relative trend regressions in table 3 show that turnout in the early television counties neither rises or falls relative to the later counties after 1952 (when all counties have television). This could reflect a constant linear television effect whose magnitude is the same across counties. Alternatively, it could reflect an effect that gets smaller over time combined with a smaller effect overall for the later counties. The results in columns 6 through 8 show that the estimated quadratic term is highly sensitive to which interaction terms are included as well. It is positive in all specifications (suggesting the effect is getting smaller over time), but it is only significant in the regression with only the first TV year interaction. The magnitude ranges from .002 (implying that it would take 93 years for the effect to die out entirely) to .0255 (implying that this would take only 6 years). This suggests that there is some non-linearity, but that the exact functional form is beyond the power of this data to identify convincingly. It also suggests that estimates of the total impact of television over a long period of time are unlikely to be very precise.

6.4 Magnitudes

We can evaluate the magnitude of the effects documented above in a number of ways. The main specifications in table 4 imply that television decreased off-year turnout by approximately 2 percent each decade after it was introduced. They imply that it decreased presidential turnout by .7 percent, although this estimate is not significantly different from zero. As context for these numbers, the overall negative trend in non-south turnout since the 1950’s was 3.4 percent per decade, and the negative trend in presidential turnout was 3.2 percent per decade, implying that television accounted for 60 percent of the off-year decline and (possibly) 22 percent of the presidential decline. Although these effects assume that the per-year decline in voting remains constant over time, and so might overstate how much of the decline television explains, they probably do not do so by much because most of the aggregate decline took place before 1970.

To more accurately assess the effect on overall turnout, it is necessary to take account of the fact that television was introduced to different counties at different times and that the effect was
larger in some counties than others. To do so, I estimate counter-factual aggregate turnout levels based on the estimated parameters. The preferred specification is the non-linear model in column 8 of table 7 to which I add separate television effects for presidential and off-years—this allows both a squared term in years of television and a full set of interactions. I also check the results for the basic specification in column 6 of table 4 and the specification with interaction terms only in column 5 of table 7, again allowing for a separate presidential year effect. For each model, I ask how much higher turnout would have been had television never been introduced assuming that television caused no further effect after 1970. As a point of reference for these results, the difference between the average non-south turnout level in the 1950s and in the 1980s-90s was 11 percentage points for off-year elections and 13 points for presidential elections. The difference between the highest and lowest turnout years between 1940 and 2000 is 16 points for off-year elections and 18 points for presidential elections.

The results of this counterfactual experiment are as follows. For non-south turnout, the total impact of television by 1970 is estimated to be a reduction of 5.6 percent in off-year elections and 3.1 percent in presidential elections. Television therefore accounts for 50 percent of the off-year decline and 24 percent of the presidential year decline since 1950.

As stressed above, however, the difficulty of separately identifying a non-linear effect within counties and heterogeneity across counties means that these estimates can vary significantly depending on the specification. Thus, the specification with interactions but no non-linear term gives effects of 9.5 percent for presidential years and 6.2 percent for off years, while the basic specification with neither non-linear terms nor heterogeneity gives effects of 4.1 percent and 1.3 percent respectively. The differences across these models are intuitive: we would expect the model without non-linear terms to overstate television’s effect when we extrapolate far beyond the introduction date, since the per year impact is not allowed to fall over time; omitting interactions should cause us to understate the aggregate effect because the largest counties were also the ones that had the largest effects. Nevertheless, the variability of the estimated magnitudes suggest they should be interpreted with a great deal of caution.

7 How did television affect turnout?

In the introduction, I argued that crowding out of political information provides a plausible mechanism linking television and voting. The goal of this section is to present a range of evidence consistent with this prediction. I will not be able to identify precisely how much of the effect on turnout worked through this channel, but the results build a strong case that information played a critical role.
7.1 Substitution among media

The first kind of evidence comes from examining the extent to which television caused substitution away from other news sources—specifically newspapers and radio. This is relevant because the amount of political information provided by television in its early years was substantially less than that provided by either newspapers or radio, making it unlikely that a dramatic shift away from the latter media would lead the public to become better informed. Predictably given the large economies of scale in television broadcasting relative to newspaper publishing, the difference was especially large for more local elections.

A variety of evidence documents the difference in political coverage across media. Until the mid-1960’s, television news in general was extremely limited. Until 1963, NBC and CBS evening news programs were only fifteen minutes in length, and ABC did not switch to a thirty-minute format until 1967. Local stations prior to 1963 usually scheduled 30 minutes of news programming, of which 20 minutes was taken up by sports and weather (Sterling and Kittross 2001) points out that the entire text of a national newscast from the 1950’s would fill only three columns on the front page of the New York Times. The comparison to radio is also stark: in 1950 and 1955, network radio had about 7 times as much regularly scheduled news as network television (Sterling 1984). Moreover, the difference between television and other media did not disappear after the 1960’s. Morgan and Shanahan (1992) summarize a number of studies in the political science literature showing that those who turn to television news as their main source of information have lower levels of political knowledge, trust government less, and are less likely to participate in the political process in ways other than voting than those who rely on other media. This evidence is primarily correlational, but it is suggestive of the way television differs from other media.

Evidence for the greater difference in local coverage comes from a series of Roper Surveys conducted in 1952, 1964, 1968, and 1972. The percentage of respondents saying television was their most important source of information about national elections was about twice as large as the fraction saying newspapers. For local elections, on the other hand, the percentage saying television was the most important source was 25-35 percent lower than the percentage saying newspapers (Sterling 1984, 165). Similar evidence for later years comes from the National Election Studies which show that for the presidential years from 1970 to 1980, more respondents heard about the election on television than in newspapers, with the reverse pattern holding for off-year elections. Perhaps the most compelling piece of evidence is Mondak (1995). This study is based on a survey of Pittsburgh residents during an 8-month newspaper strike in 1992. Comparing Pittsburgh to demographically matched residents in a nearby county not affected by the strike, Mondak finds that those deprived of a local newspaper but with continuing access to television report significantly less knowledge of candidates and issues in the House campaign, but no difference in knowledge of the
What remains is to show that television indeed reduced consumption of newspapers and radio. For radio, even casual evidence of this substitution is very strong. The average number of radio-listening hours per household per day fell from four hours in 1950 to just more than two in 1955 (prior to 1950, the number of viewing hours had been roughly constant since 1930; Sterling 1984, 220). Ratings for evening radio programs in New York fell by 60-80 percent between 1948 and 1951 (Gould 1951d). National Election Study data shows that the fraction of people who got most of their information about elections from radio fell from 32 percent in 1952 to 11 percent in 1956, while the fraction getting most of their information from television rose from 34 percent to 51 percent over the same period.

For newspapers, it is possible to analyze changes in state-level circulation using the variation in the timing of television’s introduction discussed above. Figure 10 shows total circulation of daily newspapers per capita from 1900-2000. The series increases until 1945-50 where it plateaus and then declines steadily. Circumstantially, at least, this suggests a prominent role for television. To verify this, I divide states into three groups based on when their first station began broadcasting: before 1945, 1945-51, and 1952 and after. Figure 11 shows circulation of daily newspapers per thousand people in these the first two groups of states relative to the third (for example, the first panel shows circulation per thousand in the pre-1945 states minus circulation per thousand in the third group.) Although the clarity of the picture is limited by the fact that data does not extend prior to 1945, the graphs are consistent with a negative effect of television. Both series show relative declines over the 1946-1952 period. In the second group of states, most of which got television in 1948 or 1949, the decline becomes significantly steeper after these years. Also, both trends flatten out after 1953 when most states in the reference group had television, though this is much more pronounced in the second panel than in the first.

A more direct way to look at substitution among media for political information specifically is to use data from the 1952 National Election Study (discussed briefly in the data section above.) The primary limitation of this data is that it is a single cross-section, and so does not allow me to control for unobserved time-constant heterogeneity among counties. However, 1952 was the end of the FCC freeze and was therefore likely to have been the year in which idiosyncratic variation in the availability of television was greatest. This was confirmed by the placebo regression in table 2 which showed that after controlling for DMA log income and log population, county percent non-white, and region dummies, the dummy for TV availability is uncorrelated with observable individual characteristics. All regressions in this section include DMA log income and log population; region dummies; county percent non-white, population, percent urban, population density, median age, median income, median schooling; and individual level dummies for age, education occupation,
sex, white race, highest income category, political party identification, and missing values of each control, as well as continuous controls for number of children and log income. The independent variable of interest is a dummy for whether or not the respondent’s county had television.

Table 8 shows results from three specifications in which the dependent variables are responses to the following questions:

- Did you read about the campaign in any newspaper?
- Did you listen to speeches or discussions about the campaign on the radio?
- Did you watch any programs about the campaign on television?

The results show a large and highly significant substitution effect. Respondents in television counties were 11.6 percent less likely to have read about the campaign in the newspaper and 28.5 percent less likely to have heard about the campaign on the radio. Each coefficient is significant at the one percent level, and their magnitudes are large relative to the 79 percent and 70 percent of the overall sample getting campaign information from newspapers and radio respectively. Note, too, that both the newspaper and radio variables are positively correlated with education and income. Since counties with higher education and income were more likely to have television, this argues against the radio and newspaper coefficients being driven by unobservable variation in the overall level of economic development. The final column verifies that substantially more people watched programs about the campaign on television in the counties coded as having television in 1952. This is primarily a check on the validity of the data. The percentage watching is also large, at 45 percent, suggesting television was already an important political outlet.  

### 7.2 Direct measures of political information

The second kind of evidence that I present on television and information also comes from the 1952 National Election Study, but concerns direct measures of political knowledge and engagement. Although the survey did not include factual questions such as the name of a respondent’s representative or the length of a senator’s term, it did include a number of questions which elicited information measures indirectly. The first set of such questions are those in the pre-election survey asking respondents about their voting intentions. Respondents were asked:

- Who do you plan to vote for as United States senator?
- How about congressman? Who do you plan to vote for there?
- Who do you think you will vote for as governor here in [state]?  

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27

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28This coefficient is slightly lower than the percentage of individuals in the overall sample watching on television, partly reflecting the fact that some individuals not in television counties reported having watched campaign programs. This could result both from travel to other counties during the campaign season and measurement error in the television variable.
These were free response questions, and the data was coded to indicate whether the respondents mentioned a candidate actually running in the relevant race, an incorrect candidate, or simply a party with no mention of a specific candidate. The question was only asked of respondents who said they intended to vote in the election (I drop other respondents from this analysis.) For each question, I create a dummy variable equal to one if the respondent correctly named a candidate running in the race and equal to zero otherwise. Because races for senate and governor are statewide while congressional races are more local (California currently has 54 separate races, for example), we would expect television stations to devote substantially less coverage to any given congressional race. This suggests that the negative effect of television should be largest for the congressional question.

The second set of questions took a similar form, but was asked retrospectively after the election. Respondents were asked whether or not they voted for each office, and if they answered affirmatively, were asked “who did you vote for?” This was again a free response question and was coded as above. In the analysis of this question, I use only those who voted for the relevant office. I create a dummy variable equal to one if the respondent correctly named a candidate.

The third set of questions concern opinions about the presidential candidates, the vice presidential candidates, and the parties. For the presidential candidates Stevenson and Eisenhower, respondents were asked:

Is there anything in particular about [candidate] that would make you want to vote for him?
Is there anything in particular about [candidate] that would make you want to vote against him?

For the vice presidential candidates, they were asked:

How about the candidates for vice president? Aside from their parties do you have any strong opinions about either of them?

Finally, for each of the two major parties, they were asked:

Is there anything in particular you like about [party]?
Is there anything in particular you don’t like about [party]?

All of these were free response questions, and the respondents were allowed to give as many different answers as they liked. These were coded separately. I create three variables equal to the total number

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29 A question was also asked about presidential voting intentions but it was coded differently and did not distinguish correct and incorrect responses.
of likes and dislikes given for the presidential candidates, the vice presidential candidates, and the parties respectively. The predictions one could make about the relative size of television’s effect on these variables are less clear than for knowledge of candidates, but given the extensive coverage of presidential candidates we would expect the presidential effect to be the smallest of the three.

The results of this analysis are presented in table 9. The regressions all include the same controls as those in table 8, and differ only in the dependent variables and the number of observations. The first thing to note about the table is that all but one of the education and income coefficients are positive, and the majority are significant. This provides some confirmation that the dependent variables are picking up what they are intended to. It also suggests that omitted variables positively correlated with the overall level of economic development (the main predictor of early television entry) would bias the results against finding a negative effect on information.

The coefficients on the pre-election variables are negative and significant for knowledge of congressional candidates, and positive and insignificant for knowledge of senatorial and gubernatorial candidates. This is consistent with the prediction that the negative effect should be larger for the more local race. One might have expected some negative effects on the senatorial and gubernatorial variables, however, since these races still receive limited coverage on the national network programs that make up a large portion of viewership. The magnitude of the congressional coefficient is very large—having television predicts being 24.8 percent less likely to provide the name of a congressional candidate, while only 26.1 percent of the overall sample was able to do so. Note, however, that since television areas have higher education and income, the regression does not predict that the fraction answering in these areas with television would be zero.

The post-election coefficients are all negative, with the largest effect on knowledge of congressional candidates. Both the senate and house coefficients are significant. Having television predicts being 34 percent less likely to name a candidate for congress, 24 percent less likely to name a candidate for senate, and 11 percent less likely to name a candidate for governor. This compares to 49 percent, 66 percent, and 76 percent respectively naming such candidates in the sample as a whole. Why the post-election effects are larger than the pre-election effects is not immediately obvious, although it may simply reflect the fact that this is a more highly selected group (it only includes those who actually voted) and so had higher baseline levels of knowledge overall.

Finally, the total number of strengths and weaknesses respondents listed for the president, vice president, and parties was lower in areas with television, although the effect is not significant. The coefficient is -.807, which compares to a mean number of responses in the sample of 9.04. Looking at the specific questions, the effect on opinions about the presidential candidates is negative but relatively small and insignificant. The effect on opinions about the vice presidential candidates is negative and significant at the one percent level, and the effect on opinions about the parties
is negative and insignificant. The vice presidential coefficient is -.186 and the party coefficient is -.399; however, the former is larger than the later when considered relative to the mean levels of these two variables which are .525 and 4.44 respectively.

Taken together these results provide strong evidence that television caused substitution away from newspapers and radio, and that this in turn caused a large drop in levels of information about candidates in the 1952 election, with the strongest and most significant effects on information about congressional candidates.

7.3 Interaction with number of congressional districts

The final piece of evidence I report is the interaction between the television effect and the number of congressional districts in a television market. Recall that the contrast between presidential and off-year congressional elections is the key piece of evidence tying together the information and turnout results. Congressional elections are less covered on television and extensively covered in newspapers, and these are the races for which the effect of television on both information and turnout is largest. The number of districts provides an additional “difference” to test: within congressional elections, television coverage should be limited in television markets that are fragmented into many districts. This should make the television effect on both information and turnout in congressional races largest in such markets. Importantly, the number of districts should not change the television effect in presidential years.

Of course the number of districts in a market is far from exogenous. Because representation in the House of Representatives is proportional, the number of districts in a state is a mechanical function of population. The number of districts in a television market will also depend on population, but the relationship will be less perfect, since district boundaries are often highly irregular and do not follow county boundaries. Once population is controlled for, the remaining variation should be relatively idiosyncratic.

I define the number of districts in a DMA based on the county-level ICPSR voting data. These data report the congressional district of each county, or the number of different districts in the county if there is more than one. Unfortunately, since they do not identify the individual districts in a multiple-district county, there are some ambiguous cases. For example, if county A and county B have two districts each, they might together account for anywhere from two to four. I use the upper-bound measure (in this case four), assuming that all such districts are unique. This will likely overstate the variance in districts, biasing the magnitude of the estimated effect downward, but the ordering of counties in terms of number of districts should remain roughly the same.

I first ask whether the effect of television on information about congressional candidates is more negative in markets with more congressional districts. I repeat the National Election Study
regressions of table 9 where the dependent variable is being able to name a House candidate both before and after the election. I add interactions between television and both population and the number of districts, as well as levels of the latter variables. I do not present these results, but the interaction between television and number of districts is not significant in either specification. It is small and positive for the pre-election question and small and negative for the post-election question, with the t-statistic in both cases less than one.\textsuperscript{30}

Table 10 presents turnout regressions which include interactions with the number of districts. In contrast with the analysis of the National Election Study, these results are significant and align closely with what the information mechanism would predict. The regressions are the same as the main specification (table 4) except that they include separate interactions between number of districts and years of television for presidential and off-year elections. They also include an interaction between years of television and population as a control. The first column shows the regression with only county and region-year fixed effects, the second column adds time-polynomial interactions, and the third column adds levels of demographics. The effect of television on off-year turnout is significantly more negative in markets with more congressional districts, with a one standard deviation increase in the number of districts increasing the magnitude by 18 percent in the final specification. In contrast, the number of districts has no effect on the presidential year effect once the time polynomial controls are added, and the difference between the off-year and presidential interactions is significant at the one percent level. These results are not conclusive given the failure to find first-stage effects on the National Election Study measure. But they do provide some additional evidence that crowding out of information is the mechanism that links television and turnout.

8 Robustness and limitations

Table 11 presents a number of additional results that show both the robustness and the limitations of the analysis presented so far. The first row of the table repeats the coefficients on television years for presidential and off-year elections in the main specification, shown earlier in column 6 of table 4. The next row shows coefficients for the same regression with the earliest group of counties (those that got television prior to 1945) excluded. Recall that based on the summary statistics shown in table 1, this group of counties differed significantly from the others on observables, while the correlation between observables and the timing of television for the later counties was much smaller.

\textsuperscript{30}I have also checked the effect on the other information variables. These are all insignificant as we would predict, with the exception of the effect on post-election knowledge of senate candidates, which is significantly positive. One possibility is that when there are more House races television stations substitute more time to Senate races. However, this result is best interpreted as a further caution that the number of districts variable may be correlated with some unobservable market characteristics.
Note, too, that looking only at the later counties increases substantially the fraction of variance in timing accounted for by the FCC freeze. The results show that the television effect does not change significantly when the earliest counties are excluded. The next specification drops counties that are assigned by Nielsen to multiple DMAs. Previously, these counties had been assigned to whichever DMA accounted for the largest fraction of households. The third specification drops counties that have missing voting data for any of the years in the analysis, creating a balanced panel. Varying the sample in these ways also leaves the results essentially unchanged.

The second part of the table presents three ways of conducting the analysis using primarily variation between, rather than within, DMAs. Recall that in the discussion of identification above, I said that within-DMA heterogeneity was one of the key features of the data that allowed the television effect to be identified separately from shocks correlated with city size or income. The limitation of this identification strategy, however, is that it depends on the assumption that there are no unobserved shocks that are correlated across all counties in the roughly 100-mile radius that makes up the DMA. If such shocks did exist, the observation that turnout in a rural county close to Chicago fell in the late 1940’s relative to turnout in a rural county far from a large metro area might reflect spurious correlation rather than a causal effect of television.

The results in table 11 show that when I do not exploit within-DMA variation, the coefficients on television’s effect remain negative, but they are no longer consistently significant. The first row shows a model that uses data aggregated to the DMA level. Here the coefficient on off-year turnout falls to -.144 (from a baseline of -.196) but is not significant. The next row uses county-level data but clusters standard errors at the DMA rather than the county level, allowing arbitrary correlation across counties within the DMA. This also makes the coefficient insignificant, with the t-statistic falling to -1.2. The final row maintains the county-level specification but includes interactions between DMA-level log population and log income and a fourth-order polynomial in time. This is a different way of eliminating variation caused by proximity to a large city—changes in turnout in a rural county near Chicago around the time television was introduced would be picked up by the DMA-level interaction terms. Including these interactions causes the magnitude of the coefficient to fall to -.120 and its standard error to increase, although it remains significant at the 10 percent level. Taken together, these results suggest that the results of this paper do hinge critically on exploiting within-DMA heterogeneity. The negative effect of television does not disappear entirely when this variation is excluded, but the significance falls substantially. This limitation should be borne in mind in interpreting the results.

The third part of the table looks at the effect of television on roll-off. I define this to be the difference in presidential years between the fraction of eligible voters casting votes for congress and the fraction casting votes for president (note that roll-off defined this way will generally be negative.)
Recall that throughout the paper I have been using a different measure of the difference between presidential and congressional voting: the difference between congressional turnout in presidential and off-year elections. As discussed in the introduction, the latter is four to five times larger than the former, since voters who have paid the fixed costs of going to the polls tend to cast votes in all major contests, and is the most closely linked to theory. Nevertheless, some theories would predict that having less information about congressional candidates would make voters more likely to abstain from voting even in the absence of any costs.\textsuperscript{31} The first row of the table repeats the baseline specification using only presidential year elections and making roll-off the dependent variable. The coefficient on years of television is insignificant, and its sign actually suggests that television makes voters more likely to cast votes in congressional contests. The next two rows shows the same specification omitting observations with the most extreme values of roll-off. This causes the coefficient to switch sign, suggesting that television causes relatively fewer voters to cast votes for congress, and in the final specification this coefficient is significant. Nevertheless, without some strong a priori reason to exclude these extreme observations, the most we can conclude is that the data does not reveal a consistent effect of television on roll-off.

\section{Conclusions}

Taken together, the results of this paper tell a consistent story. Although television did provide a new medium for delivering political information, it also offered consumers a wide array of new ways to use their leisure time. The fact that even in 1950 the average television household was watching for four and a half hours per day makes clear what a dramatic improvement television was over previous entertainment technologies. Faced with both a reduction in a price of information and a much larger drop in the price of entertainment, consumers responded by substituting away from the former and toward the latter. This substitution was largest where the information provided by television was most limited: local elections.

Consistent with a large body of existing evidence linking information to turnout, this in turn caused fewer voters to go to the polls. The effect was particularly strong in exactly those elections where the drop in information was shown to be the largest. The evidence linking television to a drop in voting is robust to partitioning counties into groups by demographic characteristics, controlling explicitly for demographics, and allowing non-linear functions of time interacted with demographics. The magnitude of the effect interacts in an intuitive way with observed characteristics of counties.

The results also highlight two limitations of the analysis. First, heterogeneity among counties within television markets is not only helpful for identification but is indispensable. In regressions that use only between-market variation, the television effect remains negative and similar in mag-

\footnote{See, for example, the asymmetric information model of Feddersen and Pesendorfer (1996).}
nitude, but is no longer consistently significant. Second, the effect of television on “roll-off”—the fraction of voters who go to the polls in a presidential election year but do not cast a vote for congress—is significantly positive in some specifications, but not robustly so.

Among the motivations for this study discussed in the introduction was a paradox: the coincidence of dramatic improvements in media and education with a sharp decline in turnout. These results provide a partial resolution to this paradox by showing that not only did television fail to increase information and turnout, it was an important cause of the decline, explaining half of the drop in off-year turnout since 1950, and possibly a quarter of the drop in presidential years. Furthermore, the logic that underlies these results may apply much more broadly. The improvements in media and education that are at the root of the apparent paradox have been accompanied by a proliferation of new ways to spend leisure time, from cable, to video games, to DVDs, to the Internet. While a conclusive answer will require detailed study of these broader trends, it would not be surprising to find that this expansion of choices led more and more people to shift time away from following politics. Whether this is detrimental or beneficial to social welfare overall is a challenging question that I will defer to future work.
References


Dill, William Adelbert (1928). Growth of Newspapers in the United States. Lawrence, University of Kansas Department of Journalism.


Editor and Publisher (1946-1971). Editor and Publisher Yearbook Number. New York.


Figure 1
Television penetration by first television year

Source: Television Factbooks; census data.
Notes: The height of each bar is the fraction of households with television sets as recorded in the 1950 or 1960 census, averaged over all DMAs that received television in the given year. Years in which no county received their first station are omitted from the figure.
Figure 2
Percent of US households with television by county size

Notes: "A Counties" are all counties in the 25 largest metropolitan areas. "B Counties" are all counties not in A with populations of over 150,000 or in metropolitan areas over 150,000. "C Counties" are all others.

Figure 3
Hours of viewing per television household

Notes: Based on Nielsen Media Research data.
Figure 4
Number of commercial VHF stations

Source: Television Factbooks.
Figure 5
Congressional turnout in presidential election years

Notes: Figures are total votes cast for House candidates divided by legally eligible electorate (as defined by age, sex, race, and citizenship.)

Figure 6
Congressional turnout in non-presidential years

Notes: Figures are total votes cast for House candidates divided by legally eligible electorate (as defined by age, sex, race, and citizenship.)
Figure 7
Population of counties by year television introduced

Source: Television Factbooks; census data.
Notes: Height of each bar is the total population in counties whose first television station began broadcasting in the given year. A small number of counties (total population .6 million) that first received television after 1960 are not shown.
**Figure 8**
The Chicago DMA

<table>
<thead>
<tr>
<th>County</th>
<th>State</th>
<th>Percent urban</th>
<th>Population per square mile</th>
<th>Median income ($1950)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kendall</td>
<td>IL</td>
<td>0%</td>
<td>38</td>
<td>$3,229</td>
</tr>
<tr>
<td>Newton</td>
<td>IN</td>
<td>0%</td>
<td>27</td>
<td>$2,778</td>
</tr>
<tr>
<td>Jasper</td>
<td>IN</td>
<td>24%</td>
<td>30</td>
<td>$2,557</td>
</tr>
<tr>
<td>McHenry</td>
<td>IL</td>
<td>36%</td>
<td>83</td>
<td>$3,574</td>
</tr>
<tr>
<td>Grundy</td>
<td>IL</td>
<td>36%</td>
<td>44</td>
<td>$3,351</td>
</tr>
<tr>
<td>Porter</td>
<td>IN</td>
<td>40%</td>
<td>94</td>
<td>$3,574</td>
</tr>
<tr>
<td>Kankakee</td>
<td>IL</td>
<td>50%</td>
<td>108</td>
<td>$3,421</td>
</tr>
<tr>
<td>DeKalb</td>
<td>IL</td>
<td>51%</td>
<td>64</td>
<td>$3,299</td>
</tr>
<tr>
<td>La Porte</td>
<td>IN</td>
<td>60%</td>
<td>126</td>
<td>$3,409</td>
</tr>
<tr>
<td>Lake</td>
<td>IL</td>
<td>61%</td>
<td>392</td>
<td>$4,021</td>
</tr>
<tr>
<td>La Salle</td>
<td>IL</td>
<td>67%</td>
<td>87</td>
<td>$3,447</td>
</tr>
<tr>
<td>Will</td>
<td>IL</td>
<td>67%</td>
<td>159</td>
<td>$3,698</td>
</tr>
<tr>
<td>Kane</td>
<td>IL</td>
<td>76%</td>
<td>291</td>
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<tr>
<td>DuPage</td>
<td>IL</td>
<td>76%</td>
<td>467</td>
<td>$4,531</td>
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<tr>
<td>Lake</td>
<td>IN</td>
<td>93%</td>
<td>716</td>
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</tr>
<tr>
<td>Cook</td>
<td>IL</td>
<td>99%</td>
<td>4726</td>
<td>$4,085</td>
</tr>
<tr>
<td><strong>Entire Chicago DMA</strong></td>
<td></td>
<td>92%</td>
<td>635</td>
<td><strong>$4,085</strong></td>
</tr>
</tbody>
</table>

*Source: Nielsen Media Research; census data.*
Figure 9
Voter turnout by year of television’s introduction  
(Relative to post-1951 counties)

Source: ICPSR data. Television Factbooks.
Notes: Turnout is the percentage of eligible voters casting ballots in congressional elections. Figures are based on the residuals from a regression of county turnout on region-year fixed effects. The first panel plots the difference of the mean of the residuals for counties where television was introduced prior to 1945 and the mean for counties where television was introduced after 1951. The second panel plots the difference of the mean for counties where television was introduced between 1945 and 1951 and the mean for counties where television was introduced after 1951.
Figure 10
Total circulation of daily newspapers per capita

Source: Dill (1928), N.W. Ayer and Sons (various years), Editor and Publisher Yearbook.
Notes: Figures are total circulation divided by total population.
Figure 11

Circulation of daily newspapers by year of television's introduction
(Relative to Post-1951 States)

Source: Editor and Publisher Yearbook.

Notes: Figures show total daily newspaper circulation per thousand people for the given group minus daily newspaper circulation per thousand people in states getting television after 1952.
Table 1
Summary statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>S. dev.</th>
<th>1940-1944</th>
<th>1945-51</th>
<th>1952 and later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent urban (1950)</td>
<td>29.0</td>
<td>27.1</td>
<td>60.4</td>
<td>31.6</td>
<td>26.0</td>
</tr>
<tr>
<td>Population (1960 '000)</td>
<td>59,428</td>
<td>208,549</td>
<td>466,960</td>
<td>76,057</td>
<td>31,278</td>
</tr>
<tr>
<td>Income per capita (1959)</td>
<td>$1,352</td>
<td>405</td>
<td>$2,044</td>
<td>$1,391</td>
<td>$1,298</td>
</tr>
<tr>
<td>% high school (1950)</td>
<td>27.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median age</td>
<td>28.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent non-white (1950)</td>
<td>10.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population per square mile (1950)</td>
<td>209</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base year turnout (1940)</td>
<td>56.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>2958</td>
<td></td>
<td>83</td>
<td>1052</td>
<td>1823</td>
</tr>
</tbody>
</table>

Source: Census data.
Notes: Population density is persons per square mile. Median schooling is median completed years of schooling for persons 25 years of age and older. Income per capita is as of 1959, measured in 1959 dollars, and population is as of 1960 for comparability, measured in thousands.
Table 2  
Placebo regressions with post-freeze dummy as dependent variable  
(*F-test for joint significance of demographics)*

<table>
<thead>
<tr>
<th></th>
<th>( F )</th>
<th># significant coeffs</th>
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</thead>
<tbody>
<tr>
<td>Lowest third of counties by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population (1960 '000)</td>
<td>1.32</td>
<td>0 of 8</td>
</tr>
<tr>
<td>Population per square mile (1950)</td>
<td>2.23*</td>
<td>1 of 8</td>
</tr>
<tr>
<td>Percent urban (1950)</td>
<td>4.38**</td>
<td>1 of 8</td>
</tr>
<tr>
<td>Income per capita (1959)</td>
<td>1.50</td>
<td>0 of 8</td>
</tr>
<tr>
<td>% high school (1950)</td>
<td>2.29*</td>
<td>1 of 8</td>
</tr>
<tr>
<td>1940 turnout</td>
<td>1.92</td>
<td>1 of 8</td>
</tr>
<tr>
<td>Full sample after controlling for log population, log income, and 1940 turnout</td>
<td>1.04</td>
<td>0 of 5</td>
</tr>
<tr>
<td>National Election Study sample</td>
<td>1.31</td>
<td>1 of 28</td>
</tr>
</tbody>
</table>

Source: National Election Study 1952; Television Factbooks; census data.  
* Significant at the 5 percent level.  
** Significant at the 1 percent level.  
Notes: The two columns show \( F \)-statistics for the joint significance of the demographic variables in each regression and the number of coefficients significant at the 5 percent level respectively. The "lowest third of counties" regressions use only counties falling into the lowest third of the indicated demographics; the dependent variable is a dummy equal to one if television was introduced in 1952 or later and the right-hand-side variables are log total income, log population, percent urban, percent non-white, percent high school, median age, population density, and 1940 turnout; region dummies are also included but not reported in the \( F \)-test. In the "full sample" regression, the dependent variable is the residual from a regression of the post-freeze dummy on log population, log total income, 1940 turnout, and region dummies; the right-hand variables are percent urban, percent non-white, percent high school, median age, and population density. In the "National Election Study" regression, the dependent variable is the residual from a regression of a dummy for having TV in 1952 on DMA log population and log total income, county percent non-white, and region dummies; the right-hand side variables are individual-level dummies for male, white, age categories, education categories, occupation categories, income in the highest category, and missing values, as well as number of children and log income.
Table 3
**Differential trends in voter turnout by year of television’s introduction**
*(Relative to counties where television was introduced in 1952 or later)*

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First year of TV before 1945</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative Trend, 1944-50</td>
<td>-.513</td>
<td>-.414</td>
<td>-.399</td>
</tr>
<tr>
<td></td>
<td>(.0775)</td>
<td>(.0777)</td>
<td>(.0750)</td>
</tr>
<tr>
<td>Relative Trend, 1952+</td>
<td>-.306</td>
<td>-.006</td>
<td>.026</td>
</tr>
<tr>
<td></td>
<td>(.0618)</td>
<td>(.0542)</td>
<td>(.0535)</td>
</tr>
<tr>
<td><strong>First year of TV 1945-51</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative Trend, 1946-50</td>
<td>-.125</td>
<td>-.101</td>
<td>-.106</td>
</tr>
<tr>
<td></td>
<td>(.0391)</td>
<td>(.0396)</td>
<td>(.0386)</td>
</tr>
<tr>
<td>Relative Trend, 1952+</td>
<td>-.139</td>
<td>-.030</td>
<td>-.0219</td>
</tr>
<tr>
<td></td>
<td>(.0241)</td>
<td>(.0192)</td>
<td>(.0194)</td>
</tr>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Time Polynomial * Demographics</strong></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>County, Year-Region Dummies:</strong></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>R-Squared</strong></td>
<td>.914</td>
<td>.925</td>
<td>.927</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>46003</td>
<td>46003</td>
<td>46003</td>
</tr>
</tbody>
</table>

**Source:** ICPSR voting data; Television Factbooks; census data.

**Notes:** Standard errors clustered by county. Dependent variable is the percentage of legally eligible voters casting a vote for congress. All trends are relative to counties getting television in 1952 or later. When years are given for a relative trend (e.g. 1944-50), the coefficient is on a variable equal to zero in the first year (1944), one in the second year (1945), and so forth. All regressions include county fixed effects, separate year fixed effects by census region, the absolute difference between the Democrat and Republican vote percentages, and a dummy for a missing value for the absolute difference.

Demographics are log population, population density, percent urban, percent non-white, median income, median age, and percent with high-school education. Time Polynomial * Demographics is a fourth-order polynomial in time interacted with 1960 log population, 1959 log total income, 1940 congressional turnout, and an indicator for a missing value of 1940 congressional turnout. As discussed in the text, all regressions exclude counties whose first year of television was after 1959.
Table 4
Regressions of turnout on years of television

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of TV</td>
<td>-0.416</td>
<td>-0.152</td>
<td>-0.136</td>
<td>-0.489</td>
<td>-0.212</td>
<td>-0.196</td>
<td>-0.193</td>
<td>-0.187</td>
<td>-0.188</td>
</tr>
<tr>
<td></td>
<td>(0.0486)</td>
<td>(0.0426)</td>
<td>(0.0412)</td>
<td>(0.0577)</td>
<td>(0.0491)</td>
<td>(0.0478)</td>
<td>(0.0483)</td>
<td>(0.0478)</td>
<td>(0.0477)</td>
</tr>
<tr>
<td>Years of TV * Presidential Year</td>
<td>-0.332</td>
<td>-0.082</td>
<td>-0.067</td>
<td>-0.067</td>
<td>-0.059</td>
<td>-0.056</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0468)</td>
<td>(0.0451)</td>
<td>(0.0438)</td>
<td>(0.0443)</td>
<td>(0.0437)</td>
<td>(0.0434)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Time-Polynomial Interactions:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time * Percent Urban</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time * Population Density</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time * Percent non-White</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Polynomial * Demographics</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>County, Year-Region Dummies:</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.913</td>
<td>0.925</td>
<td>0.927</td>
<td>0.913</td>
<td>0.925</td>
<td>0.927</td>
<td>0.927</td>
<td>0.927</td>
<td>0.927</td>
</tr>
<tr>
<td>N</td>
<td>46003</td>
<td>46003</td>
<td>46003</td>
<td>46003</td>
<td>46003</td>
<td>46003</td>
<td>46003</td>
<td>46003</td>
<td>46003</td>
</tr>
</tbody>
</table>

Source: ICPSR voting data; Television Factbooks; census data.
Notes: Standard errors clustered by county. Years of TV is the number of years since the first year in which a commercial station was broadcasting in the county for at least three months. The dependent variable is the percentage of legally eligible voters casting votes for congress. Fixed effects, demographics and time polynomial interactions are as in table 3. All regressions include the absolute difference between the Democratic and Republican vote percentage. Additional time-polynomial interactions are interactions of a fourth-degree polynomial in time with the indicated demographics.
Table 5
Regressions of turnout on years of television for subsets of counties with similar demographics
(Coefficient on years of television)

<table>
<thead>
<tr>
<th>Counties partitioned by:</th>
<th>Lowest third</th>
<th>2nd third</th>
<th>Highest third</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>-.332**</td>
<td>-.228**</td>
<td>-.443**</td>
</tr>
<tr>
<td></td>
<td>(.1045)</td>
<td>(.0798)</td>
<td>(.0819)</td>
</tr>
<tr>
<td>Population density</td>
<td>-.447**</td>
<td>-.239**</td>
<td>-.289**</td>
</tr>
<tr>
<td></td>
<td>(.1041)</td>
<td>(.0798)</td>
<td>(.0827)</td>
</tr>
<tr>
<td>Percent urban</td>
<td>-.380**</td>
<td>-.296**</td>
<td>-.440**</td>
</tr>
<tr>
<td></td>
<td>(.0940)</td>
<td>(.0885)</td>
<td>(.0733)</td>
</tr>
<tr>
<td>Per capita income</td>
<td>-.127</td>
<td>-.228**</td>
<td>-.578**</td>
</tr>
<tr>
<td></td>
<td>(.0984)</td>
<td>(.0803)</td>
<td>(.0817)</td>
</tr>
<tr>
<td>% high school</td>
<td>-.275**</td>
<td>-.282**</td>
<td>-.706**</td>
</tr>
<tr>
<td></td>
<td>(.0940)</td>
<td>(.0798)</td>
<td>(.0752)</td>
</tr>
<tr>
<td>1940 turnout</td>
<td>-.160*</td>
<td>-.365**</td>
<td>-.518**</td>
</tr>
<tr>
<td></td>
<td>(.0778)</td>
<td>(.0788)</td>
<td>(.0781)</td>
</tr>
</tbody>
</table>

Source: ICPSR voting data; Television Factbooks; census data.
* Significant at the 5 percent level.
** Significant at the 1 percent level.

Notes: Standard errors clustered by county. Table shows coefficient on years of TV from regressions of turnout on the absolute difference between the Democrat and Republican vote percentages, county dummies, and year-region dummies. The years of TV variable is as in Table 4. 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.
Table 6

Effect of demographics on diffusion of television and sensitivity of turnout

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1960 TV penetration</td>
<td>Sensitivity of turnout to election competitiveness</td>
</tr>
<tr>
<td>(mean=79.1 stdev=12.03)</td>
<td>(coeff at mean=-.144 stderr=.00210)</td>
<td></td>
</tr>
<tr>
<td>Percent urban</td>
<td>-.0528 (.00222)</td>
<td>-.000530 (.000105)</td>
</tr>
<tr>
<td>Log population</td>
<td>3.15 (.0493)</td>
<td>.00386 (.00221)</td>
</tr>
<tr>
<td>Log per capita income</td>
<td>15.81 (.246)</td>
<td>.0800 (.0107)</td>
</tr>
<tr>
<td>% high school</td>
<td>.0473 (.00596)</td>
<td>.00297 (.000302)</td>
</tr>
<tr>
<td>Median age</td>
<td>.405 (.01224)</td>
<td>-.00214 (.000580)</td>
</tr>
<tr>
<td>Percent non-white</td>
<td>-.125 (.00277)</td>
<td>-.000532 (.000131)</td>
</tr>
<tr>
<td>Population per square mile</td>
<td>-.000294 (.000193)</td>
<td>-.00637 (.00145)</td>
</tr>
<tr>
<td>Base year turnout</td>
<td>-.000517 (.000110)</td>
<td></td>
</tr>
</tbody>
</table>

Source: ICPSR voting data; Television Factbooks; census data.

Notes: Standard errors clustered by county. Column 1 shows coefficients from a regression of the percent of households with televisions in 1960 on the specified demographic characteristics and dummies for the year the county received television. Column 2 shows interaction terms from a regression of congressional turnout on the absolute difference between the Democratic and Republican vote percentage, and interactions of this absolute difference with the specified demographics. (The coefficient on the absolute difference at the mean of the data and its standard deviation are shown at the top of column 2.)
### Table 7

**Interactions and non-linear effects**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of TV</td>
<td>-.128</td>
<td>-.123</td>
<td>-.138</td>
<td>-.114</td>
<td>-.199</td>
<td>-.186</td>
<td>-.160</td>
<td>-.192</td>
</tr>
<tr>
<td></td>
<td>(.0422)</td>
<td>(.0413)</td>
<td>(.0421)</td>
<td>(.0425)</td>
<td>(.0528)</td>
<td>(.0489)</td>
<td>(.0522)</td>
<td>(.0543)</td>
</tr>
<tr>
<td>Years of TV squared</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.00235</td>
<td>.0255</td>
<td>.0104</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(.00205)</td>
<td>(.0125)</td>
<td>(.0126)</td>
<td></td>
</tr>
</tbody>
</table>

**Interaction with:**

| Predicted diffusion          | -.0184| -.0168| -.0171| -.0167|
|                              | (.00367)| (.00365)| (.00367)| (.00374)|
| Predicted sensitivity        | -.0828| -.108 | -.111 | -.110 |
|                              | (.0138)| (.0147)| (.0149)| (.0150)|
| First TV year                | -.00761| .0466| .01281|
|                              | (.00419)| (.0252)| (.0256)|
| Percent urban                | -.000337|
|                              | (.000476)|
| Log population               | .131 |
|                              | (.0394)|
| Log income per capita        | -.360 |
|                              | (.192)|
| % high school                | .00372 |
|                              | (.00145)|
| Median age                   | -.0236 |
|                              | (.00286)|
| Percent non-white            | -.00264 |
|                              | (.000968)|
| Population per square mile   | -.0123 |
|                              | (.00278)|
| Base year turnout            | -.00380 |
|                              | (.00194)|

**Demographics**

| X | X | X | X | X | X | X | X |

**Time Polynomial * Demographics**

| X | X | X | X | X | X | X | X |

**County, Year-Region Dummies:**

| X | X | X | X | X | X | X | X |

**R-Squared**

| .9273 | .9270 | .9269 | .9270 | .9271 | .9268 | .9268 | .9271 |

**N**

| 42832 | 46003 | 42832 | 42832 | 42832 | 46003 | 46003 | 42832 |

*Source: ICPSR voting data; Television Factbooks; census data.*

**Notes:** Standard errors clustered by county. The dependent variable, fixed effects, demographics and time polynomial interactions are as in table 3. The Years of TV variable is as in table 4. All regressions include the absolute difference between the Democrat and Republican vote percentage. All interactions are the Years of TV variable times the interaction variable minus its mean. Predicted diffusion and predicted sensitivity are measures derived from the regressions in table 6 as described in the text.
Table 8

Media use in the 1952 election

<table>
<thead>
<tr>
<th>Dep. var:</th>
<th>Any campaign info from:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Newspaper</td>
<td>Radio</td>
<td>Television</td>
</tr>
<tr>
<td>TV dummy</td>
<td>-0.114</td>
<td>-0.283</td>
<td>0.445</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.0402)</td>
<td>(.0423)</td>
<td>(.0745)</td>
<td></td>
</tr>
<tr>
<td>Log income</td>
<td>0.0752</td>
<td>0.000037</td>
<td>0.1136</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.0211)</td>
<td>(.0172)</td>
<td>(.0339)</td>
<td></td>
</tr>
<tr>
<td>Ed: high school</td>
<td>0.119</td>
<td>0.0815</td>
<td>0.1133</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.0207)</td>
<td>(.0297)</td>
<td>(.0312)</td>
<td></td>
</tr>
<tr>
<td>Ed: college</td>
<td>0.165</td>
<td>0.0936</td>
<td>0.1224</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.0163)</td>
<td>(.0515)</td>
<td>(.0677)</td>
<td></td>
</tr>
<tr>
<td>Mean of dep. var.</td>
<td>.791</td>
<td>.699</td>
<td>.514</td>
<td></td>
</tr>
<tr>
<td>R-Squared</td>
<td>.185</td>
<td>.089</td>
<td>.309</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>1693</td>
<td>1705</td>
<td>1653</td>
<td></td>
</tr>
</tbody>
</table>

Source: National Election Study 1952; Television Factbooks; census data.

Notes: Robust standard errors in parentheses. Coefficients are marginal effects from probit regressions. In addition to controls shown, all regressions include individual-level dummies for age, occupation, sex, white race, highest income category, political party identification, and missing values of each control, as well as a continuous control for number of children. Each also includes controls for DMA-level log income and population; county-level population, percent urban, population density, percent non-white, median age, median income, and median schooling; and dummies for census regions. The TV dummy is one if the respondent's county had television prior to 1952. The "any campaign info" variables are dummies equal to one if the respondent reported obtaining information from the given source.
### Table 9

**Political information in the 1952 election**

<table>
<thead>
<tr>
<th>Dep. var.</th>
<th>Able to name candidate pre-election:</th>
<th>Able to name candidate post-election:</th>
<th>Number of strengths/weaknesses cited:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>House</td>
<td>Senate</td>
<td>Governor</td>
</tr>
<tr>
<td>TV dummy</td>
<td>-0.248</td>
<td>0.08916</td>
<td>0.0392</td>
</tr>
<tr>
<td></td>
<td>(.1155)</td>
<td>(.1353)</td>
<td>(.0811)</td>
</tr>
<tr>
<td>Log income</td>
<td>0.0192</td>
<td>0.0344</td>
<td>0.0360</td>
</tr>
<tr>
<td></td>
<td>(.0373)</td>
<td>(.0481)</td>
<td>(.0416)</td>
</tr>
<tr>
<td>Ed: high school</td>
<td>0.120</td>
<td>0.181</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(.0553)</td>
<td>(.0507)</td>
<td>(.0291)</td>
</tr>
<tr>
<td>Ed: college</td>
<td>0.198</td>
<td>0.224</td>
<td>0.016</td>
</tr>
<tr>
<td></td>
<td>(.0987)</td>
<td>(.0690)</td>
<td>(.0676)</td>
</tr>
<tr>
<td>Mean of dep. var.</td>
<td>.261</td>
<td>.280</td>
<td>.272</td>
</tr>
<tr>
<td>R-Squared</td>
<td>.181</td>
<td>.166</td>
<td>.201</td>
</tr>
<tr>
<td>N</td>
<td>653</td>
<td>525</td>
<td>612</td>
</tr>
</tbody>
</table>

**Source:** National Election Study 1952; Television Factbooks; census data.

**Notes:** Standard errors clustered by county. Coefficients in first six columns are marginal effects from probit regressions. Coefficients in the last four columns are from OLS regressions. Controls are as in table 8. "Able to name candidate pre-election" variables are dummies equal to one if the respondent gave the name of a candidate that they intended to vote for for the specified office in the pre-election interview, and equal to zero if they simply named a party or mentioned a candidate not running; respondents who said they did not intend to vote for the specified office are omitted. "Able to name candidate post-election" variables are dummies equal to one if the respondent gave the name of a candidate that they voted for the specified office in the post-election interview, and equal to zero if they simply named a party or mentioned a candidate not running; respondents who said they did not vote for the specified office are omitted. "Number of strengths/weaknesses cited" is the number of separate responses coded for free-response questions in which the respondent was asked to list positive and negative aspects of the presidential candidates, the vice-presidential candidates, and the two parties overall.
### Table 10

**Interactions with number of congressional districts**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(<strong>number of districts:</strong> mean=0  stdev=5.78)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Off-year elections</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of TV</td>
<td>-.374</td>
<td>-.158</td>
<td>-.144</td>
</tr>
<tr>
<td></td>
<td>(.0584)</td>
<td>(.0502)</td>
<td>(.0486)</td>
</tr>
<tr>
<td>Years of TV * number of districts</td>
<td>-.00829</td>
<td>-.00488</td>
<td>-.00462</td>
</tr>
<tr>
<td></td>
<td>(.00130)</td>
<td>(.00138)</td>
<td>(.00126)</td>
</tr>
<tr>
<td><strong>Presidential elections</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Years of TV</td>
<td>-.268</td>
<td>-.0726</td>
<td>-.0597</td>
</tr>
<tr>
<td></td>
<td>(.0479)</td>
<td>(.0471)</td>
<td>(.0454)</td>
</tr>
<tr>
<td>Years of TV * number of districts</td>
<td>-.0048</td>
<td>-.00148</td>
<td>-.00119</td>
</tr>
<tr>
<td></td>
<td>(.00139)</td>
<td>(.00147)</td>
<td>(.00133)</td>
</tr>
<tr>
<td><strong>Interaction terms</strong></td>
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<tr>
<td>Demographics</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Polynomial * Demographics</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>County, Year*Region Dummies:</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>R-Squared</strong></td>
<td>.914</td>
<td>.925</td>
<td>.927</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>46003</td>
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</tr>
</tbody>
</table>

*Source: ICPSR Voting Data; Television Factbooks; Census Data.*

*Notes:* Standard errors clustered by county. Number of districts is measured at the DMA-level. All regressions include an interaction between years of population and 1950 DMA population as a control. Years of TV, dependent variable, fixed effects, demographics and time polynomial interactions are as in table 3. All regressions include the absolute difference between the Democratic and Republican vote percentage.
Table 11
Robustness checks

<table>
<thead>
<tr>
<th></th>
<th>Years of TV coefficient</th>
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<tbody>
<tr>
<td></td>
<td>Off years</td>
</tr>
<tr>
<td>Baseline regression</td>
<td>-0.196</td>
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<tr>
<td></td>
<td>(.0478)</td>
</tr>
<tr>
<td>Omit pre-1945 counties</td>
<td>-0.162</td>
</tr>
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<td></td>
<td>(.0501)</td>
</tr>
<tr>
<td>Omit multiple-DMA counties</td>
<td>-0.192</td>
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<tr>
<td></td>
<td>(.0479)</td>
</tr>
<tr>
<td>Balanced panel</td>
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<td></td>
<td>(.0523)</td>
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<td>DMA-level analysis:</td>
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<tr>
<td>Aggregate data</td>
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<td></td>
<td>(.160)</td>
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<tr>
<td>Clustering at DMA-level</td>
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<td></td>
<td>(.152)</td>
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<tr>
<td>Time polynomial * DMA demos</td>
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<td></td>
<td>(.0670)</td>
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<tr>
<td>Roll-off as dependent variable</td>
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<tr>
<td>Complete sample</td>
<td>0.0230</td>
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<td></td>
<td>(.0330)</td>
</tr>
<tr>
<td>Dep. var. between 1st and 99th pctile</td>
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</tr>
<tr>
<td></td>
<td>(.0280)</td>
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<tr>
<td>Dep. var. between 5th and 95th pctile</td>
<td>-0.0407</td>
</tr>
<tr>
<td></td>
<td>(.0201)</td>
</tr>
</tbody>
</table>

Source: ICPSR voting data; Television Factbooks; census data.

Notes: Congressional turnout is the dependent variable, as in table 2. Standard errors clustered by county except where indicated. Years of TV, fixed effects, demographics and time polynomial interactions are as in table 4. All regressions include the absolute difference between the Democratic and Republican vote percentage. Baseline regression repeats coefficients from column 6 of table 4. Balanced panel omits any county that has at least one year of missing voting data. The DMA-level analysis regressions are with observations defined at the DMA level; with observations defined at the county level but clustering at the DMA level; and with interactions of a fourth-order polynomial in time interacted with DMA-level log population and log income. The roll-off regressions have the same form but the sample includes only presidential-year elections and the dependent variable is the difference between the fraction of eligible voters casting votes for congress and the fraction casting votes for president (note that if television depresses congressional turnout the years of TV coefficient should be negative.) The second two rows use subsets of the data excluding observations with the most extreme values of roll-off.