

# Press Coverage and Political Accountability

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We estimate the impact of press coverage on citizen knowledge, politicians' actions, and policy. We find that voters living in areas where, for exogenous reasons, the press covers their U.S. House representative less are less likely to recall their representative's name and less able to describe and rate him or her. Congressmen who are less covered by the local press work less for their constituencies: they are less likely to stand witness before congressional hearings, to serve on constituency-oriented committees (perhaps), and to vote against the party line. Finally, federal spending is lower in areas with exogenously lower press coverage of congressmen.

## I. Introduction

It has long been recognized that having a press that actively covers politics is essential for democratic governance. Informed voters are better able to hold elected officials accountable for their policy decisions, and most people get their information via the media. In the words of

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Thomas Jefferson, "The functionaries of every government have propensities to command at will the liberty and property of their constituents. There is no safe deposit for these but with the people themselves, nor can they be safe with them without information. Where the press is free, and every man able to read, all is safe."<sup>1</sup>

Frequently, however, an active press is missing from the political stage. At the national level, this is true in many weak democracies and poor countries, often because of political oppression or lack of an economic base to support large mass media. This is true also in mature democracies with a free press, in particular for lower levels of government. One reason is that local politics is boring to many people. Another reason is that there is often a poor fit between media markets and political jurisdictions, making coverage of some jurisdictions too costly. This problem may be increasing with growing media market size, consolidations in the media industry, and a shift from print to electronic media. As the number of active political units within each media market that require media attention increases, reporting, by necessity, becomes more selective and superficial. To counter this trend, regulations such as the Newspaper Preservation Act and the Federal Communications Commission's "must carry" laws aim at ensuring local content and programming. For similar reasons, many governments subsidize domestic media.

Despite these important and long-standing concerns, empirical evidence of the effects of active media coverage is scarce. One reason is that media coverage is endogenous to most outcome variables of interest. For example, a number of studies have found better governance in countries where the media actively covers politics (Ahrend 2002; Brunetti and Weder 2003; Djankov et al. 2003). However, allowing active political coverage is a governmental choice, and more corrupt governments have stronger incentives to silence the press. So, correlations between governance and active political coverage may simply reflect that these variables are jointly determined, as discussed by Besley and Prat (2006). Similarly, while some studies find a correlation between media coverage and voter knowledge, this correlation might simply reflect the fact that news coverage and knowledge are both driven by citizens' intrinsic interest in politics.

One way to more convincingly identify an effect of active media coverage on voters, politicians, and policy is to find a number of similar political jurisdictions where some factor causes news coverage of politics to vary but does not directly affect our outcome variables. The factor

<sup>1</sup> Thomas Jefferson to Charles Yancey, January 6, 1816. Thomas Jefferson Papers Series 1, General Correspondence, 1651–1827, Library of Congress, *American Memory*, <http://memory.loc.gov/>.

we propose is the match, or “congruence,” between newspaper markets and U.S. congressional districts. The “economic geography” factors that determine media markets are generally quite different from the “political geography” factors that determine congressional district boundaries. Therefore, it seems reasonable a priori that the match between the two will be haphazard. Below we present some evidence to this effect. In addition, panel features of our data allow us to estimate two specifications that are particularly convincing (at least to us). One of these specifications focuses on changes in congruence between media markets and congressional district that are due to redistricting. The other employs congressional district-by-year fixed effects and thus focuses on variation within congressional districts. Note that we cannot use these specifications when analyzing variables at the district level in Section V, so the effects in that section are less well identified.

The paper follows the chain of media impacts, link by link: congruence increases newspapers’ political coverage, which, in turn, makes voters better informed, which increases monitoring and induces politicians to work harder, which, finally, produces better policies (for their constituencies). Figure 1 shows these links, together with simple bivariate graphs of the main relationships of interest.<sup>2</sup> The paper is devoted to investigating whether the patterns in those graphs is driven by a causal effect of Congruence and whether that effect arises because of changing incentives for the newspapers to cover politics.

We start by defining the congruence between newspaper markets and congressional districts in Section II. The measure we use is based on the share of a newspaper’s readership that lives in a given district. In figure 1a, the left image shows a perfect match between media markets and congressional districts. Every person in both districts buys newspapers that sell only in this district. The situation on the right depicts a worse match, where each person reads a newspaper that has only half of the sales in his or her district. Intuitively, newspaper coverage of a congressman should be increasing in this readership share. Since more than one newspaper sells in each district, we define congruence as the circulation-weighted average of readership for all newspapers sold in a district.

We then explore whether newspaper coverage is increasing in the readership share in Section III. Using online editions, we counted the number of articles mentioning House representatives in 161 newspapers, which, on average, cover 385 districts in each congress from 1991 to 2002. We find that coverage of representatives is strongly increasing

<sup>2</sup> Each point in the graphs shows the mean value of the  $y$  variable within each percentile of Congruence. So, e.g., the first point in the “witness appearances” graph (fig. 1f) shows the mean Congruence and witness appearances in the lowest-Congruence percentile.

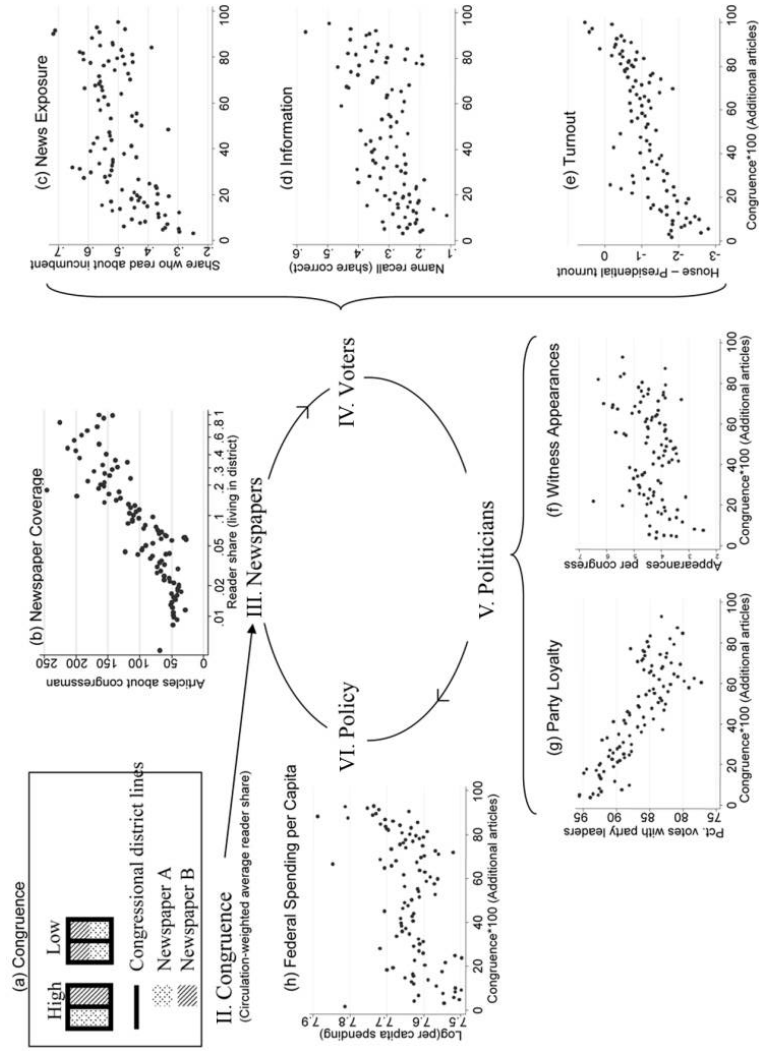


FIG. 1.—Structure of empirical investigation

in district readership shares. This can clearly be seen from the graph in figure 1*b*, which plots the number of articles mentioning a given representative in a given newspaper as a function of the share of that newspaper's readers who live in the representative's district.

Quantitatively, we find that an increase of congruence from zero to one is associated with 100 additional newspaper articles about the congressman reaching an average household. This normalization is used in figure 1*c–h*. Note that our sample of newspapers is not necessarily representative of the national average and that we have observations only for later years. For this reason, we cannot directly analyze the effects of changing actual news coverage. We still find it useful when discussing magnitudes to relate the size of the effects to the estimated increase in news coverage in this subsample.

Voters in noncongruent areas are exposed to less news about their representatives, since the newspapers sold in their area simply devote less coverage to their House representative. Section IV explores whether this affects voters. After analyzing survey responses from the American National Election Studies for 1984–2004, we find that a larger share of the voters in congruent areas report reading about their House representative in a newspaper or magazine. Figure 1*c* plots this relationship. Voters from more congruent areas are also better informed about their House representative. More precisely, they are better able to correctly name at least one of the candidates in the House election. They are also more willing to place their representative ideologically, to rate their representative on a feeling thermometer, and to mention things that they like or dislike about their representative. The graph in figure 1*d* plots the share that can correctly recall a House candidate's name against congruence. Since voter information is key to accountability, this relationship is extensively explored. We also study how news coverage affects voting. We find that people in more congruent areas participate more in elections and tend to vote more for the incumbent. Figure 1*e* plots the gap between turnout in House and presidential elections against congruence.

Section V then studies effects on representatives' behavior. Some representatives are elected from districts that "fall through the cracks" of some or all local newspapers, and the press is largely silent about them. Others are elected from highly congruent districts with ample coverage and comparatively well-informed voters. Such representatives might therefore have a greater incentive to work for their constituency, for example, by considering constituency (rather than party or personal) interests in voting and by engaging in pork barrel politics. One useful strategy for bringing pork to the district is to serve on "constituency" committees with jurisdiction over particularistic spending programs. Another is to appear as a witness before congressional hearings, arguing

for local projects. To analyze these aspects of representative effort, we collected roll call voting data for all House members for 1982–2002 and data on committee assignments and witness appearances for 1982–2004. We find that congressmen from highly congruent districts are more disciplined by their constituencies: their voting conforms less to the party line, they are more likely to stand witness before congressional hearings, and they are, perhaps, more likely to serve on constituency-oriented committees and also less likely to serve on broad policy-oriented committees. Figure 1*f* and *g* shows the corresponding bivariate graphs for witness appearances and party loyalty in roll call voting.

If the representatives' efforts in Congress are successful, then we should observe more federal funds flowing into highly congruent districts and into more congruent counties within districts. To test this, we assembled data on federal expenditure allocations across counties from the Consolidated Federal Funds Report, 1983–2004. The total value of the expenditures we study is about \$2,700 per capita (in year 2000 dollar values), or about 10 percent of U.S. GDP. We find that more congruent counties have received higher federal expenditures per capita. Figure 1*g* shows the corresponding bivariate graph.

As mentioned, this paper is closely related to the literature on the political consequences of having media that actively cover politics. In particular, our results in Section V are related to those of Cohen, Noll, and Zaller (n.d.), who study how the amount of information available to voters affects congressional roll call voting behavior, using an approach similar to ours. Consistent with our results, they find evidence that representatives in low-information districts vote in a more purely partisan manner, whereas those in high-information districts are more responsive to the underlying ideology of the district. Our work is also related to several papers that use television media market definitions to explore the importance of mass media on the incumbency advantage and campaign finance (see Campbell, Alford, and Henry 1984; Niemi, Powell, and Bicknell 1986; Stewart and Reynolds 1990; Levy and Squire 2000; Ansolabehere, Snowberg, and Snyder 2006).

While we study the effects of media content, our results are also related to a number of studies of the effect of media penetration and media use. For example, our results in Section IV are closely related to a literature on the effects of mass media use on information.<sup>3</sup> However, while there are numerous studies regressing measures of political knowl-

<sup>3</sup> Examples include Robinson and Levy (1986), Berkowitz and Pritchard (1989), Delli Carpini and Keeter (1989), Robinson and Davis (1990), Weaver and Drew (1993), and Arnold (2004). Mondak (1995) exploits a quasi experiment—a newspaper strike in Pittsburgh in 1992 that closed the city's two major newspapers for 8 months. Unfortunately, he has responses only to vaguely worded questions about respondents' knowledge of local politics.

edge on self-reported media exposure (plus other controls), none of them convincingly identifies a causal relationship. One problem is that people who are interested in politics consume more political news, from a variety of sources, causing political knowledge and news consumption to be positively correlated. The results in Section VI are related to the findings that media penetration has been found to influence government spending (Strömberg 1999, 2004*b*; Besley and Burgess 2002). Our approach is different since we study the effects of changing the messages (articles about congressmen), holding constant the share of people who receive the messages (penetration rates).

Before proceeding, we must briefly discuss why we focus on newspapers and ignore radio and television. The existing evidence indicates that local television stations devote much less coverage to Congress than local newspapers (Hess 1991; Vinson 2003). In one analysis, we compare the impact of television market structure and newspaper market structure on voter knowledge (Sec. IV.A) and find that television appears to have no effect on voters' knowledge about their congressmen. Less is known about radio, and this will require further investigation.

## II. Congruence

The driving force behind all results in this paper is that the number of articles,  $q_{md}$ , that a newspaper  $m$  writes about a House representative from district  $d$  is strongly increasing in the share of this newspaper's readers who live in district  $d$ ,  $\text{ReaderShare}_{md}$ . We present strong evidence of this in the empirical section. For simplicity, we assume a linear relationship,

$$q_{md} = \alpha_0 + \alpha_1 \text{ReaderShare}_{md}. \quad (1)$$

We will investigate the impact of news coverage on voters and U.S. House representatives in counties or districts where, typically, more than one newspaper has sales. We thus need a measure of average news coverage in these areas. The sales-weighted average number of articles about a congressman in district  $d$  in an area  $c$  with  $M$  papers is

$$q_{cd} = \sum_{m=1}^M \text{MarketShare}_{mc} q_{md} = \alpha_0 + \alpha_1 \text{Congruence}_{cd}, \quad (2)$$

where  $\text{MarketShare}_{mc}$  is newspaper  $m$ 's share of newspaper sales in area  $c$ , and

$$\text{Congruence}_{cd} = \sum_{m=1}^M \text{MarketShare}_{mc} \text{ReaderShare}_{md}. \quad (3)$$

We will use variation in Congruence to identify effects of newspaper

coverage of House representatives. We will show that Congruence is strongly correlated with news coverage of congressmen. We will also present evidence that Congruence is exogenous to our outcome variables. Note that since Congruence is defined using market shares, it is not dependent on the total newspaper penetration in the county. This is important since total newspaper readership in an area is related to characteristics such as education and income levels, which are also related to political knowledge.

To measure Congruence, we combine newspaper sales data with demographic data. Each year, the Audit Bureau of Circulation (ABC) collects data on each newspaper's circulation in each county, for almost all U.S. newspapers. We have these data for 1982 and for the period 1991–2004. We complemented this with county-circulation data for non-ABC newspapers for 2004 and 1991 and interpolated values in between those years. These were mainly smaller papers, and the data were provided by Standard Rate and Date Service.<sup>4</sup> In our data, the average number of newspaper copies sold in a year is 56 million. The average number of copies sold per household is 0.58, falling from around 0.70 in 1982 to 0.50 in 2004. The U.S. Census Bureau collects data on the number of people in each congressional district, by county. We have these data for the censuses of 1980, 1990, and 2000. For the years 1983–90, when we do not have circulation data, we interpolate Congruence. The formulas used for computing Congruence and ReaderShare are shown in the Appendix.

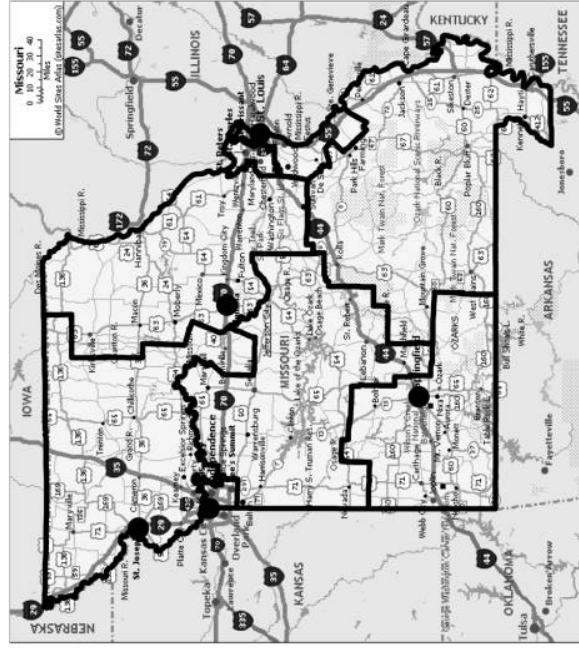
To illustrate how Congruence varies, consider the case of Missouri, shown in figure 2. Newspapers are typically located in the larger cities and towns and sell to markets around them. The two largest cities in Missouri, Kansas City and St. Louis, both lie on the state border, and their markets cross this border. The third- and fourth-largest cities (disregarding cities that are part of the Kansas City and St. Louis metropolitan areas) are Springfield and Columbia, both located in the interior of the state and a congressional district. Finally, the fifth-largest city, St. Joseph, is located on the state border, but the areas across the border in Nebraska and Kansas are not densely populated.

The congressional district borders of Missouri are drawn with solid lines. First, look at the congressional district to the northwest. In the north, the *St. Joseph News Press* is the dominant paper. We expect this newspaper to mainly cover this congressional district since 93 percent of its readers live in this district. Therefore, Congruence is high in that area. In the southern part of the district, people read the *Kansas City*

<sup>4</sup> On average there are about 10,900 observations each year in the ABC data and about 500 observations in the non-ABC data. There are about 3,000 counties in the United States, so the average number of observations per county in each year is slightly less than four.



Congressional districts



Congruence between newspaper markets and congressional districts

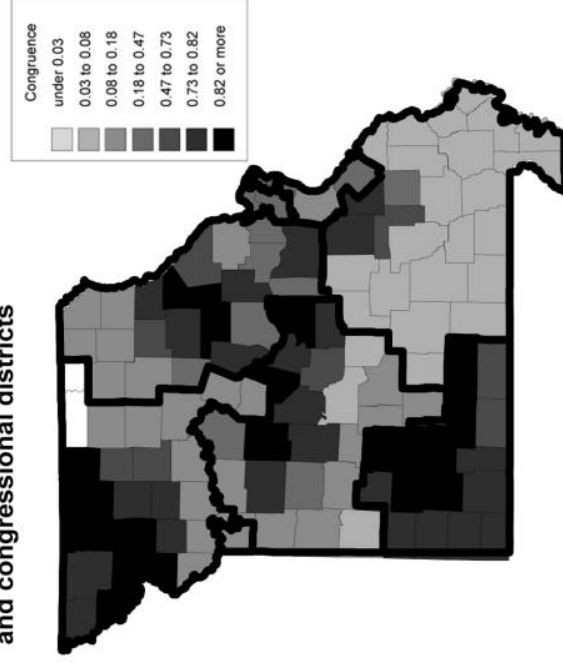


FIG. 2.—Congruence in Missouri

*Star*, with 18 percent of its readers in this district, and thus Congruence is much smaller. The *Columbia Daily Tribune* sells in the small “appendix” region to the southeast and has only 5 percent of its readers in this district. As a result, Congruence in that area is low.

The district in the southwest has high congruence. It has two major papers, the *Joplin Globe* (with 80 percent of its sales in this district) and the *Springfield News Leader* (87 percent). Note how the eastern counties of this district have high Congruence, whereas the adjoining county to the east of Springfield has a very low value. Similar strong differences in Congruence between neighboring counties are found in the central and central-northeast parts. These differences are due to the match between congressional districts and the markets of a string of moderately sized papers: the *Sedalia Democrat*, the *Columbia Daily Tribune*, the *Post-Tribune/Capital Times*, the *Mexico Ledger*, and the *Hannibal Courier-Post*.

We also construct a measure for congruence of television markets, TVCongruence. To identify radio and television markets, we use the designated media markets (DMAs). A DMA is defined by Nielsen Media Research as all counties whose largest television viewing share is given to stations of that same market area. There are 210 nonoverlapping DMAs that cover the entire continental United States, Hawaii, and parts of Alaska. Since we do not have viewership data by county, we assume that everyone in a media market watches broadcasts only from that market. For a county  $c$  in media market  $m$ , TVCongruence <sub>$cd$</sub>  is thus defined as the population share of media market  $m$  that lies in district  $d$ . Figure 3 shows how TVCongruence is constructed in Missouri. In the graph to the left, the solid lines are the congressional district boundaries and the fillings identify the media markets. The graph to the right shows the resulting TVCongruence.

A key identifying assumption in the empirical investigation is that Congruence is not directly related to variables such as voters’ intrinsic interest in politics. We explore this extensively below. For now, note that this seems a priori reasonable. The economic geography factors that determine media markets are generally quite different from the political geography factors that determine congressional district boundaries.<sup>5</sup> This is quite apparent from figure 3, showing both media markets and

<sup>5</sup> Congressional districts’ boundaries are drawn under the constraints that all districts in each state must have the same population, constraints imposed by courts on racial considerations, partisan considerations, the desire to protect incumbents, and so on. To satisfy the population requirement, congressional district lines are redrawn after the population count of each census. In our sample period, the congressional lines were redrawn in 1992 on the basis of the 1990 Census and in 2002 on the basis of the 2000 Census.

Newspapers, however, typically locate in large cities, with strong demand for advertising and news about city affairs. Their county sales depend strongly on the distance between the county and the newspaper seat and characteristics of the county residents such as their incomes, their level of education, and their age structure.

Congressional districts and  
TV markets (DMA's)

Congruence between TV markets (DMA's)  
and congressional districts



FIG. 3.—TVCongruence in Missouri

congressional districts. The match between these economic and political geography concerns creates the haphazard patterns in figures 2 and 3.

### III. Newspaper Coverage

In this section, we examine the main force behind the results in this paper: that the number of articles that a newspaper writes about a House representative is increasing in the estimated fraction of the newspaper's readers who live in the associated congressional district, the Reader Share.

Our data cover the period 1991–2002 (103rd–107th Congresses). The sample consists of 161 newspapers that, on average, cover 385 districts for each congress.<sup>6</sup> We used the NewsLibrary.com Web site, which employs a common search engine to search the online archives of newspapers for 142 newspapers. We supplemented this using Lexis/Nexis for eight newspapers. In addition, we searched 11 newspapers' Web sites directly. In all, there are 4,206 observations in our sample, where each observation is a newspaper-district (newspaper-representative) pair in a given year.

We first describe the specification for estimating equation (1). Our measure of newspaper coverage is  $q_{mdt}$ , the number of articles appearing in newspaper  $m$  during Congress  $t$  that contain both the name of the representative from district  $d$  and the word "Congress."<sup>7</sup> The main independent variable of interest is  $\text{ReaderShare}_{mdt}$ . (Note that we now use  $t$  to denote time periods; each period is a congress.) We include several other control variables that are likely to affect the amount of coverage, including indicator variables for party leaders (the Speaker of the House, majority leader, minority leader, majority whip, and minority whip), seniority, an indicator variable for freshmen, an indicator for majority party status, an indicator for out-of-state districts, variables for members in scandals, and a variable indicating whether the representative sought higher office (governor or senator) or received a higher appointment toward the end of the term. We also include the fraction of people living in urban areas and the median income. Finally, we include year fixed effects and cluster the standard errors by newspaper.

The summary statistics are shown in table 1. On average, a newspaper in our sample writes 101 articles about each congressman during each 2-year congressional period. Coverage varies considerably: the standard deviation in coverage is 97 articles. The average ReaderShare of a news-

<sup>6</sup> We do not have data on every newspaper for every year in the sample.

<sup>7</sup> For simplicity, we use two calendar years for each congress rather than the exact dates the congress is in session. Thus, for the 103rd Congress we use articles appearing January 1, 1993, through December 31, 1994; for the 104th Congress we use articles appearing January 1, 1995, through December 31, 1996; and so on.

TABLE 1  
NEWSPAPER DATA: SUMMARY STATISTICS

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Articles about congressman	4,206	101	97	0	1,454
ReaderShare	4,206	.16	.22	0	1
Circulation (100,000s)	4,206	3.41	2.70	.01	11.68
Scandal	4,206	.02	.13	0	1
Party leader	4,206	.01	.14	0	2
Higher office	4,206	.03	.17	0	1
Out of state	4,206	.13	.33	0	1
Close race	4,206	.26	.16	0	.50
Freshman	4,206	.14	.35	0	1
Retired	4,206	.09	.28	0	1
% urban	4,206	.68	.30	0	1
Median income	4,206	.37	.10	.15	.64

paper in a congressional district is 16 percent. This relatively low number partly reflects that some large newspapers contribute many newspaper-district observations. This is also the reason why the average circulation is large, 341,000.

We now investigate the relationship between the number of articles written about a congressman and the ReaderShare of the newspaper in his or her congressional district. Figure 1*b* shows the basic pattern: a very strong, positive, relationship between these variables. The ordinary least squares (OLS) results presented in table 2 show that this relationship is highly statistically significant. In terms of magnitude, an increase in the ReaderShare from zero to one is associated with 164 more articles being written about a congressman. This is roughly what one would conclude from just looking at figure 1*b*.<sup>8</sup>

Most of the controls have the effects that one would expect. Being a party leader is associated with an increase in coverage of about 155 more articles. Being involved in a scandal generates around 70 more articles. Incumbents seeking higher office feature in around 90 additional articles. Two other findings are noteworthy. First, even when we control for ReaderShare, newspapers exhibit an in-state bias, covering representatives from their home state more heavily than out-of-state representatives. Second, it does not appear that newspapers are mainly interested in providing necessary information to help voters vote in the next election. Freshmen do not receive significantly more coverage than other representatives, even though they are new and relatively unknown

<sup>8</sup> We use a linear specification for ease of interpretation. The fit is even better using log ReaderShare or regressing the share of articles about a congressman on ReaderShare (see the working paper version of this paper [Snyder and Strömberg 2008]).

TABLE 2  
NEWSPAPER COVERAGE OF U.S. HOUSE MEMBERS, 1991–2000  
Dependent Variable: Articles about Congressman

	(1)	(2)	(3)	(4)
ReaderShare	177.25 (17.95)***	164.14 (17.06)***		
Congruence			171.10 (19.42)***	170.64 (6.18)***
Party leader		154.62 (50.53)***	191.93 (72.45)***	122.70 (10.65)***
Scandal		70.21 (18.24)***	82.15 (27.37)***	45.17 (10.76)***
Higher_office (ran or appointed)		90.25 (11.22)***	98.21 (13.02)***	82.61 (8.25)***
Out_of_state		−34.75 (9.38)***	−10.45 (12.26)	−19.99 (4.19)***
Close_race		36.02 (16.87)**	53.63 (20.56)**	33.00 (11.01)***
Freshman		5.32 (3.63)	8.07 (5.08)	9.66 (4.09)**
Retired		18.38 (7.42)**	29.43 (9.26)***	19.94 (5.88)***
% urban		−18.40 (12.39)	.19 (13.37)	−34.36 (5.40)***
Median income		24.67 (37.71)	14.57 (45.38)	−24.79 (17.78)
Observations	4,206	4,206	2,308	3,421
R <sup>2</sup>	.18	.27	.26	.28

NOTE.—Results are from OLS regressions. In cols. 1 and 2, the unit of observation is a newspaper by congress. All regressions include year fixed effects. In col. 3, the unit of observation is a congressional district by congress; in col. 4, it is congressional district by county by congress. Robust standard errors, clustered by newspaper, are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

to voters. Similarly, members who are retiring receive even more coverage than those running for reelection.

The very strong relationship between ReaderShare and press coverage of representatives will drive our results. People who live in areas where Congruence (the market share weighted ReaderShare) is high will, on average, be exposed to a considerably larger number of articles about their congressman than people in other areas.

To make this point more clearly, we also estimate equation (2). To this end, we compute the circulation-weighted average number of articles about a congressman in all papers,  $q_{cd}$ , as defined in the first equality in equation (2). We then regress this on Congruence<sub>cd</sub>, defined in equation (3). We do this for the full congressional district and the congressional district by county. The results are shown in columns 3 and 4 of table 2, respectively. An increase in Congruence from zero to one is associated with around 170 more articles about the congressman.

What do these numbers imply for the expected number of articles that an average person actually reads? A back-of-the-envelope calculation is illuminating. The question can be separated into two: who gets the newspaper? and who reads the article conditional on having the paper? To answer the first question, one can look at either household penetration rates or readership numbers. Both are around 60 percent in our period of study.<sup>9</sup> Since Congruence going from zero to one is associated with 170 more articles being published in papers that reach around 60 percent of the households, the number of articles reaching an average household is 100 ( $170 \times 0.6$ ).

Regarding the second question, studies typically find that people read between a third and a fourth of all articles in a newspaper and that around half of the articles that are read are read in depth (see, e.g., Graber 1988; Garcia and Stark 1991). Graber also finds that articles about politics are read to an extent similar to that of other material. Consequently, an increase in Congruence from zero to one would be associated with an average person reading 25–33 more newspaper articles about his or her congressman each term.

In summary, Congruence going from zero to one is associated with 170 more articles about the congressman appearing in an average paper selling in his or her district. It is associated with 100 more articles reaching an average household and around 30 more articles being read. A one-standard-deviation increase in Congruence implies effects about a third as large, for example, around 10 more articles being read.

In order to determine what effects this may generate, it is useful to know what newspapers actually report when they cover members of Congress. Arnold (2004) studied newspaper coverage of House representatives in detail. In a representative sample of 25 newspapers, covering equally many House representatives in the 103rd Congress, he found 8,000 news stories mentioning the candidates. The articles were primarily news stories in reasonably prominent places. Arnold found that the most commonly covered policy-related activities of the congressmen are roll call voting, advance position taking, and acting as local agents, that is, working actively to acquire constituency benefits. Each of these three categories accounted for about 1,200 news stories. If this is representative of our sample, then newspaper coverage should inform voters about their representatives' ideological positions and how

<sup>9</sup> In our sample, the average number of newspapers sold per household is 0.58. The average total U.S. daily newspaper readership reported by the Newspaper Association of America is 60 percent of people aged above 18 for the period 1982–2004. Readership is measured by the share of survey respondents who say that they read a newspaper yesterday. See the Newspaper Association of America, "Daily Newspaper Readership Trend—Total Adults (1964–1997)," 2004, and "Daily Newspaper Readership Trend—Total Adults (1998–2007)" (<http://www.naa.org/TrendsandNumbers/Readership.aspx>).

well they act as local agents and, consequently, help voters rate their representatives.

#### IV. Voters

##### A. *Information and News Exposure*

To hold their elected representatives accountable, voters require information. Information reduces the chances that voters make “mistakes” when casting their ballots and increases the electoral cost of politicians enacting poor policies, “shirking,” and being corrupt. This was the belief of the framers of the Constitution and is a standard feature of monitoring models of political agency (e.g., Persson and Tabellini 2000; Besley 2006). A variety of models also predict that policy becomes more distorted in favor of narrow interest groups when voters are less informed and that in a pluralistic world, policy outcomes favor groups with more informed members (e.g., Grossman and Helpman 2001).

Information may also affect citizens’ welfare because it is useful in private decisions that depend on government policies or simply because voters dislike uncertainty. Bartels (1986) and Alvarez (1997) present evidence that voters dislike candidates with uncertain policy positions.<sup>10</sup> Finally, easy access to information may increase political participation.

We will analyze six variables related to voter information and news exposure. These variables are based on survey data from the American National Election Studies (ANES) from 1982 to 2004. The ANES is biannual, coinciding with congressional elections, and contains an average of about 1,800 respondents per year. The first variable is a measure of news exposure. The ANES asked respondents whether they read about their House incumbent in a newspaper or magazine. We code the variable *ReadAboutIncumbent* as one if the respondent answered yes to this question and zero if the respondent answered no. In our sample, 50 percent report reading about the incumbent (see table 3 for summary statistics).

The next two variables are based on direct knowledge questions. The ANES asked respondents if they could name the candidates in the U.S. House races in their district. We code the dummy variable *NameRecall* as one if a respondent could do this and zero otherwise. We code the variable *NameRecognition* as one if respondents could identify the incumbent from a list of the major party candidates for the U.S. House in their district and zero if they provided an incorrect answer. In our sample, 31 percent of the respondents could correctly name at least

<sup>10</sup> Although, see Berinsky and Lewis (2004) for a critique of some of this literature.



TABLE 3  
ANES DATA: SUMMARY STATISTICS

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Congruence	15,014	.46	.29	.01	.97
ReadAboutIncumbent	8,985	.5	.5	0	1
ReadAboutChallenger	8,957	.17	.38	0	1
NameRecall	14,139	.31	.46	0	1
NameRecallIncumbent	11,734	.29	.45	0	1
NameRecallChallenger	11,734	.11	.32	0	1
NameRecognition	9,624	.92	.28	0	1
FeelingThermometerProvided	12,459	.82	.38	0	1
IdeologicalRatingProvided	7,441	.7	.46	0	1
LikesOrDislikesProvided	10,775	.53	.5	0	1
NameRecallSenator	5,337	.46	.5	0	1
FeelingThermometerSenator	6,441	.91	.29	0	1
KnowsHouseMajority	14,153	.56	.5	0	1
KnowsSenateMajority	14,146	.5	.5	0	1
Hear about incumbent on TV	8,985	.5	.5	0	1
Hear about incumbent on radio	8,985	.26	.44	0	1

one of the candidates, and a considerably larger share, 92 percent, could recognize the incumbent's name on a list.

The three final variables describe respondents' willingness to describe or rate their House representative. These types of variables have been used to proxy for voter information, since voters who know little or nothing about a representative are presumably less willing to describe or rate this representative (see, e.g., Delli Carpini and Keeter 1989). These variables are also directly related to accountability. In order to hold representatives accountable, it would seem necessary to have a view about where they stand ideologically and whether there is something to like or dislike about them. The ANES asked respondents to place their House representative on a seven-point ideological scale. We code the variable *IdeologicalRatingProvided* as one if the respondent provided a rating and zero if the respondent answered "don't know" or "don't recognize" the incumbent. The survey also asked respondents to rate their feelings toward the incumbent on a scale from zero to 100. We code the variable *FeelingThermometerProvided* as one if such a rating was provided and zero if the respondent answered "don't know where to rate," "can't judge," or "don't recognize the incumbent's name." Finally, we code the variable *LikesOrDislikesProvided* as one if the respondent mentioned at least one thing he or she liked or disliked about the incumbent House representative in the district and zero if the respondent said that he or she did not know anything about this candidate. In our sample, 70 percent were willing to describe the in-

cumbent's ideological position, 82 percent provided a feeling thermometer rating, and 53 percent mentioned something that they liked or disliked about the incumbent (see table 3). Our five variables are positively, but far from perfectly, correlated. For example, 80 percent of the respondents who can name a candidate mention something that they like or dislike about the incumbent, as compared to 40 percent of those who cannot name any candidate. The simple correlations are all larger than .2 and less than .4. Not all survey questions were asked in all years, which accounts for the differences in the number of observations in table 3.

Our key independent variable is Congruence, and we use the following specification:

$$y_i = \gamma \text{Congruence}_{cdt} + \mathbf{x}_{icdt} \delta + \alpha_t + \alpha_r + \varepsilon_i,$$

where  $y_i$  are our voter information variables,  $\mathbf{x}_{icdt}$  is a vector of control variables, and  $\alpha_t$  is a year-specific fixed effect. Finally,  $\alpha_r$  is a fixed effect for each representative and three consecutive terms, for example, a fixed effect for Linda Smith's first three terms as representative for Washington's Third Congressional District, another for her next three terms, and so forth. Note that we can control for district-level variables since our data are at the survey respondent level and since  $\text{Congruence}_{cdt}$  varies across survey respondents living in different counties within the same congressional district. Since the dependent variable is dichotomous, the specification assumes a linear probability model. We employ this because the linear probability model is consistent under weak assumptions, it works well with fixed effects, and its coefficient estimates are simple to interpret. All reported standard errors are heteroskedastic consistent.

Table 4 contains regression results. The columns contain different specifications, and the panels contain results for our six dependent variables. Column 1 of table 4 shows the result of a regression of our dependent variables on Congruence, controlling only for the representative- and year-specific fixed effects. Congruence is significantly and positively correlated with all of these except NameRecognition. For this variable, the estimated coefficient on Congruence has the same size as the standard errors in these regressions. Note that the additional effect of Congruence increasing NameRecognition is likely to be small since recognizing the representative's name is fairly simple and over 90 percent do this. The other estimated coefficients of Congruence are large. For example, a change from the lowest to the highest values of Congruence is associated with a 28 percent increase in the probability of correctly recalling a candidate's name. This is about as large as the effect of changing a respondent's education from grade school to some college. We now try to establish that the coefficient estimates in this

TABLE 4  
VOTER KNOWLEDGE OF HOUSE REPRESENTATIVE

	BASELINE		WITHIN- RACE	REDISTRICTING
	(1)	(2)	(3)	(4)
Controls	No	Yes	Yes	Yes
Fixed effects	Year	State × year	District × year	State × year, county
Dependent Variable: ReadAboutIncumbent				
Congruence	.29 (.08)***	.42 (.09)***	.40 (.12)***	.30 (.09)***
Observations	8,985	8,985	8,985	8,985
R <sup>2</sup>	.12	.22	.24	.18
Dependent Variable: NameRecall				
Congruence	.28 (.07)***	.35 (.07)***	.42 (.07)***	.27 (.06)***
Observations	14,139	14,139	14,139	14,139
R <sup>2</sup>	.16	.27	.30	.24
Dependent Variable: NameRecognition				
Congruence	.04 (.05)	.08 (.05)	.10 (.06)*	.07 (.06)
Observations	9,624	9,624	9,624	9,624
R <sup>2</sup>	.27	.39	.42	.31
Dependent Variable: FeelingThermometerProvided				
Congruence	.21 (.05)***	.20 (.06)***	.19 (.07)***	.29 (.09)***
Observations	12,459	12,459	12,459	12,459
R <sup>2</sup>	.18	.25	.28	.19
Dependent Variable: IdeologicalRatingProvided				
Congruence	.22 (.09)***	.25 (.09)***	.30 (.10)***	.20 (.09)**
Observations	7,441	7,441	7,441	7,441
R <sup>2</sup>	.18	.25	.27	.19
Dependent Variable: LikesOrDislikesProvided				
Congruence	.28 (.08)***	.26 (.09)***	.21 (.09)**	.30 (.07)***
Observations	10,775	10,775	10,775	10,775
R <sup>2</sup>	.17	.29	.32	.24

NOTE.—Results are from OLS regressions. Robust standard errors, clustered by county, are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

column are good measures of the causal effect of Congruence on voter knowledge and news exposure. We extensively discuss identification concerns here. As many similar concerns will arise again in later sections, we will frequently refer back to this discussion for definitions of different sets of control variables and different specifications.

*Adding controls.*—Political knowledge and news exposure are likely to

be correlated with respondent characteristics such as education, income, and age. To distinguish the effect of the news market, we include a large set of individual-specific controls in the vector  $\mathbf{x}_{icdt}$ . We include dummy variables for whether the respondent's party identification matches that of the incumbent; for the respondent's education (four categories), income (five categories), age (seven categories), gender, and race; and the number of years the respondent has lived in the community. These are 15 variables in total after we drop one category of education, income, and age to avoid perfect collinearity.

We include seven county controls characterizing the county in which the respondent lives: population (logged), average education levels (share with 1–11 years, share with 12 years, and share with more than 12 years), per capita income (logged), share aged below 20, share aged above 65, share black, and share female. We include eight representative controls: the representative's age, tenure, and dummy variables for whether the representative is a freshman, belongs to the majority party, died or retired, serves on a powerful committee, or is a party leader, chair, or ranking member. There are three electoral-race controls: the closeness of the race, measured by the negative absolute difference between the democratic share of the vote and 0.5; a dummy variable for whether there was an incumbent running; and a dummy variable for whether the incumbent ran unopposed. We include the following urbanism controls: the degree of urbanism in the community where the respondent lives (three dummy variables), the share urban population, and logged population density. To further guard against nonlinear effects, we add five dummy variables for share urban and log population density. There are 12 urbanism control variables in total after we drop one category to avoid perfect collinearity. Finally, we include state-by-year fixed effects,  $\alpha_{yy}$ , because growing states receive additional congressional districts after redistricting, which typically changes Congruence, and state growth may be correlated with our outcome variables.

Column 2 of table 4 shows the result of regressions of our information variables on Congruence, adding all the above-mentioned controls. The estimated coefficients do not change much, and when they do change, they increase in magnitude and the standard errors hardly change at all. For example, Congruence remains significantly and positively correlated with knowledge about the candidates' names. Most demographic variables correlate with voter information in the expected direction. Older, better-educated, and higher-income respondents are more likely to be able to name a candidate, as are male, white respondents. Moreover, respondents with the same party identification as the incumbent are significantly better at naming a candidate. More respondents can correctly name a candidate when the incumbent representative is running opposed and when the incumbent is young. Finally, voters are

better able to name their representative when the county population is larger. This is the only county-specific variable that is significant.

*Within-race and redistricting specifications.*—Our main identification concerns fall into two categories: those related to representative characteristics and those related to population or location characteristics. Regarding the first, more interesting and well-known congressmen attract more media coverage. If this additional coverage affects newspaper sales, then it will induce a spurious correlation between Congruence and voter knowledge. However, the impact of coverage of the House representative on newspaper sales is likely to be very modest. A typical newspaper prints about 100 stories per congressman and year; this can be compared to the 1,000 or more stories that are typically printed about the governor. Another potential representative-related concern is that certain types of congressmen self-select into highly congruent districts. However, candidate selection is part of the media effects we wish to study. A third representative-related concern is that congressmen who become increasingly powerful manage to increase Congruence in their district during redistricting. We find no correlation between being on powerful committees and increases in Congruence. Still, this could be a potential concern.

We address these concerns by a within-congressional race specification. By including a district-by-year fixed effect, we control for all factors that are constant within congressional races, such as the characteristics of the incumbent and challenger and the type of race. This specification asks the question, Are voters who live in counties with higher Congruence than average in a certain district in a particular year better able to name their incumbent than the average in that district in that year? We can ask this question because many districts contain or overlap more than one county, so some voters (and survey respondents) in a given district live in parts of the district with a high degree of Congruence and others live in parts with a low level of Congruence.

The results from the within-race specifications are shown in table 4, column 3. The estimated coefficients on Congruence do not change to any considerable extent compared to those in columns 1 and 2; nor do the estimated standard errors.

The other category of concerns relates to population or location characteristics. The first of these is that Congruence is lower in big cities. For example, New York is carved up into a large number of congressional districts. Newspapers in the New York media market sell in many districts and will not have a large share of their readers in any district. Other concerns in this category are that Congruence may, for unknown reasons, be correlated with unobserved features that are also related to voter knowledge, such as unobserved income, education, and age structure.

We address these concerns by a redistricting specification. This uses county fixed effects and identifies Congruence effects through changes due to redistricting. We apply the 1982–2004 average sales of each newspaper in each county to all years. Consequently, Congruence in a county-district changes only when the congressional district boundaries change as a result of redistricting. For example, a county becomes more congruent if moved to a district their newspapers cover more (have larger sales in). In 1992, 1,376 counties became more congruent, 1,532 became less congruent, and in 220 there was no change. The average absolute change in Congruence was 0.1.

The results from the redistricting specifications are shown in table 4, column 4. Again, the estimated effects of Congruence retain their significance levels and do not change considerably in magnitude.

Finally, to further check robustness, we drop all observations associated with major cities from the sample and reestimate the specification in column 4. This yields very similar results. For example, the estimated coefficient on Congruence on NameRecall is 0.31 with a standard error of 0.07 (not shown in the table).

*Auxiliary regressions.*—Another piece of evidence that Congruence is unlikely to be correlated with unobserved correlates of knowledge is that it is not significantly correlated with those we do observe. As mentioned above, the estimated coefficients on Congruence in table 4 change only slightly when we include the large set of control variables, even though these variables are very significant. The reason is that our key variable, Congruence, is only weakly correlated with the variables that affect individual respondents' information levels. To make this point more formally, we regressed the dependent variables in table 4 on our controls, using the baseline specification. We then regressed the predicted values on Congruence. Congruence was never significantly correlated with the predicted values. For example, the estimated coefficient when regressing predicted NameRecall on Congruence was 0.02 with a standard error of 0.02. For a more detailed discussion of how Congruence correlates with each of the controls, see the working paper version of this paper (Snyder and Strömberg 2008).

*General knowledge effects.*—As a final robustness check, we see whether Congruence is related to general measures of voter knowledge. The congruence between a newspaper's market and a congressional district influences how much the newspaper writes about a particular congressman, but it should not influence how much the newspaper writes about many other things, such as U.S. senators or the party that controls the U.S. House or the U.S. Senate. Therefore, we replaced the dependent variable with knowledge questions not related to a particular representative or district. Table 5 shows results from regressions using our baseline specification. Columns 1 and 2 shows the results for the questions

TABLE 5  
PLACEBO: GENERAL POLITICAL KNOWLEDGE

	DEPENDENT VARIABLE			
	NameRecall Senator (1)	Feeling Thermometer Senator (2)	KnowsHouse Majority (3)	KnowsSenate Majority (4)
Congruence	.04 (.14)	-.02 (.09)	.00 (.05)	.03 (.06)
Observations	5,337	6,441	14,153	14,146
R <sup>2</sup>	.30	.22	.31	.27

NOTE.—Results are from OLS regressions. All regressions include state  $\times$  year and incumbent fixed effects and controls ("baseline specification"). Robust standard errors, clustered by county, are in parentheses.

corresponding to NameRecall and FeelingThermometerProvided for U.S. senators. Column 1 shows a regression on whether the respondent can name at least one senator correctly (46 percent of the respondents can). In column 2, the dependent variable is a dummy for whether the respondent is willing to place the incumbent senator on a feeling thermometer (91 percent are). We also check two other knowledge questions: whether the respondent knows which party had a majority in the House before the election (56 percent correct) and which party had a majority in the Senate (50 percent correct). The results show that Congruence is not correlated with any of these measures of "non-district-specific" political knowledge. This increases our confidence that the positive correlations shown in table 4, between Congruence and district-specific information, are not spurious.

*Alternative mechanisms: television and radio or electoral campaigns?*—Next, we investigate whether the effect of Congruence mainly goes through newspapers. The main alternative information sources are other media and electoral campaign activities.

Newspaper markets and radio and television markets are both centered around large cities and towns. The two measures of Congruence and TVCongruence, discussed in Section II, are fairly highly correlated, with a correlation coefficient of .64.

We first evaluate how these two congruence measures explain differential media exposure. In the surveys conducted between 1982 and 1994, the ANES asks respondents whether they have read about the incumbent House representative in a newspaper or magazine (as mentioned before, 50 percent say they have) or heard about him or her on television (50 percent) or radio (25 percent). We constructed dummy variables for positive responses to each of these three questions. Table 6 shows regressions of these dummy variables on both Congruence and TVCongruence. Column 1 shows that Congruence, but not TVCongruence, is significantly positively correlated with respondents saying that they have

TABLE 6  
TELEVISION AND RADIO

	DEPENDENT VARIABLE			
	Read/Hear about Representative from			NameRecall (4)
	Newspaper (1)	Radio (2)	Television (3)	
Congruence	.44 (.10)***	.09 (.07)	.19 (.11)*	.32 (.09)***
TVCongruence	-.28 (.22)	.63 (.19)***	.68 (.22)***	.17 (.18)
Observations	8,985	8,985	8,985	14,139
$R^2$	.22	.16	.24	.27

NOTE.—Results are from OLS regressions. All regressions include state  $\times$  year and incumbent fixed effects and controls ("baseline specification"). Robust standard errors, clustered by county, are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

read about the incumbent in a newspaper or magazine. Columns 2 and 3 show that the opposite is true for radio and television exposure. The estimated effects are large. Congruence increasing from zero to one is associated with a 45 percent increase in the share of respondents who say that they have read about the incumbent. A caveat regarding these dependent variables is necessary. We know from other studies that people have a hard time remembering exactly where they read or heard something. For example, people report seeing advertisements in areas where these advertisements have not been shown.

Interestingly, we find that TVCongruence is not significantly related to NameRecall, but Congruence is; see column 4 of table 6. This is consistent with the view that voters get most of their information about their local congressmen from newspapers rather than television. This is plausible since content analyses of television news find that local television stations devote much less news coverage to local congressmen than local newspapers do (Hess 1991; Vinson 2003; see also the discussion in Arnold [2004]).

We now explore how Congruence relates to campaign activities. One possibility is that representatives compensate with more mailings in low-Congruence areas where they get little free exposure through local newspapers.<sup>11</sup> The ANES asks respondents a set of questions regarding contact with the House incumbent: whether they have met with the incumbent in person (12 percent say yes), met with his or her staff (11 percent), received mail from the incumbent (53 percent), or attended a meeting where he or she spoke (11 percent). Table 7 shows that

<sup>11</sup> For example, Ansolabehere, Gerber, and Snyder (2003) find that representatives substitute spending from television to mail when advertising rates are high.



TABLE 7  
OTHER INFORMATION CHANNELS

	Meet with Staff	Meet Incumbent	Attend Gathering	Receive Mail
Congruence	.05 (.05)	.14 (.07)*	.12 (.08)	.16 (.09)*
Observations	8,985	8,985	8,985	8,985
$R^2$	.13	.16	.15	.24

NOTE.—Results are from OLS regressions. All regressions include state  $\times$  year and incumbent fixed effects and controls ("baseline specification"). Robust standard errors, clustered by county, are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

Congruence is not significantly related to any of these variables. This can be contrasted with the strong correlation between Congruence and the share of the respondents who say that they have read about the incumbent in a newspaper or magazine.

A final way to test whether the effect of Congruence goes through newspaper readership is to study separately the half of the sample who report not having read about the incumbent or challenger in a newspaper or magazine.<sup>12</sup> If the effect goes via newspaper stories, then Congruence should have little effect in this group. This is indeed what we find. In this subsample and using the baseline specification (col. 2 in table 4), we find that Congruence is no longer correlated with Name Recall, FeelingThermometerProvided, IdeologicalRatingProvided, or LikesOrDislikesProvided.<sup>13</sup> From the above, we conclude that the main effect of Congruence most likely goes via newspapers.

*Magnitudes.*—We now discuss the magnitudes of the effects. The probability that a respondent can correctly name one candidate in the House race increases by 10 percentage points when Congruence increases by one standard deviation. This is a sizable effect, given that only 31 percent of the respondents in our sample correctly name a candidate. Our estimates suggests that only 15 percent would have been able to name their representative without the newspaper coverage that is driven by Congruence.<sup>14</sup> Local newspapers thus seem to be a key provider of information about congressmen.

To put the results in perspective, it is instructive to do a simple cal-

<sup>12</sup> We thank an anonymous referee for suggesting this test to us.

<sup>13</sup> The estimated coefficient on Congruence is 0.14 (standard error 0.14) in a regression with NameRecall as the dependent variable. Similarly, the coefficient on Congruence is 0.09 (0.14) for FeelingThermometerProvided, 0.01 (0.24) for IdeologicalRatingProvided, and 0.08 (0.17) for LikesOrDislikesProvided. In the subsample of respondents who report reading about the incumbent, the effects are even larger and significant. For example, the effect on NameRecall is 0.51 (0.15).

<sup>14</sup> Given that the average Congruence is 0.45 and the estimated effect is 0.35, we get  $0.31 - 0.35 \times 0.45 = 0.15$ .

culuation of the average effect per newspaper story. When Congruence increases from zero to one, the share of correct answers increases by 35 percent and the expected number of newspaper articles increases by 170. The effect per additional newspaper story is an increase by 0.2 percent. In other words, it takes five additional articles to increase the share of correct answers by 1 percent. It takes more articles to produce a 1 percent increase in the number of respondents who place their representative on a feeling thermometer (nine stories), provide an ideological rating (seven stories), or mention something that they like or dislike about the incumbent (seven stories).

Another interesting statistic is the average learning effect of actually reading a newspaper story on previously uninformed individuals. The average name recall rate in the sample is 31 percent. This can be written as the sum of the estimated 15 percent who previously knew the name and the share of the 85 percent who did not but learned it from an additional newspaper article. Let  $\alpha$  be the effect of Congruence on the uninformed. Since the mean level of Congruence in the sample is 0.45, the average effect of learning is  $0.45\alpha$ . Thus,  $0.15 + 0.85 \times 0.45\alpha = 0.31$ . Solving yields  $\alpha = 0.42$ . So an increase in Congruence from zero to one is associated with an increase in the probability of recall by 42 percent in the group previously uninformed. Since it is also associated with an average 30 additional articles being read, the increase in name recall per newspaper article that is being read is 1.4 percent.

### B. Voting

Before exploring the effects on House representatives of this increased voter knowledge, we will now analyze two aspects of voting. We first explore the effects of press coverage on voter turnout and then the incumbency advantage.

*Voter turnout.*—For most Americans, voting is the main form of political participation. This participation is, in the view of many observers, beneficial per se. A high turnout in fair elections gives legitimacy to public officials and their decisions. Voting can also be effective means of holding elected officials accountable for their decisions and behavior in office. Voter abstention may signal that citizens are dissatisfied with their political institutions or lack a sense of efficacy and confidence in government, and habitual abstention may further erode citizens' satisfaction and confidence.

It is clear that Congruence could influence political participation. We have seen that it affects voters' information, and numerous surveys find a strong and positive correlation between citizens' information levels and political participation (see, e.g., Verba and Nie 1972). While causation is more difficult to establish, several studies are suggestive. The

strong correlation between education and turnout may also be interpreted as evidence that decreasing the cost of information increases participation.<sup>15</sup>

The analysis of voter turnout in House elections is complicated by the fact that people vote for multiple offices (and sometimes also controversial and important referenda). The decision to go to the voting booth depends on all these elections. One way of dealing with this is to control for turnout for the most important office. This specification analyzes “roll-off.” That is, given that a voter has come to vote for, say, the office of president, how likely is it that he or she will not vote for a congressman?<sup>16</sup>

To analyze voter turnout, we use data on votes in congressional elections by county and congressional district.<sup>17</sup> Voter turnout in the presidential election will be used as a control. We use data for presidential election years 1984–2004, except for 1996, for which we do not have data. For the 1992 and 2000 elections, we have presidential vote totals at the county level and include only counties that lie entirely within one congressional district. We drop uncontested elections and observations in which the reported election turnout is larger than the total population.

In our sample, the average roll-off in House elections relative to presidential elections is 1.2 percent. The share of the population who voted in the House election was 41.1 percent, compared to the 42.3 who voted for president (see table 8).

We regress the roll-off in House elections relative to presidential elections on Congruence, controlling for turnout in the presidential election. The results are shown in table 9. The coefficient on Congruence is highly significant in the baseline and within-race specifications. In the redistricting specification with controls, the standard errors are large and the estimated effect is not significant. Apparently there is not enough time-series variation to precisely identify effects.

As a robustness check, we substituted the roll-off in House elections with the roll-off in Senate elections and reran the regressions in table 9. Congruence should not affect Senate turnout since the newspaper

<sup>15</sup> The underlying assumption is that education reduces the costs of acquiring information. See, e.g., Wolfinger and Rosenstone (1980) for evidence of the correlation.

<sup>16</sup> Another possibility is to study elections in which there was no presidential, gubernatorial, or senatorial contest on the ballot, so the House race was arguably the “top of the ticket.” Unfortunately, we cannot do this because there are too few such cases, from a small number of states.

<sup>17</sup> We could also use the self-reported turnout data in the ANES. However, it is well known that respondents grossly overstate their propensity to vote and also overstate their propensity to vote for winning candidates and incumbents (at least in U.S. House races). For this reason, we prefer the actual voting data. When we analyze the ANES we find significant and even larger effects of Congruence on both voter turnout and the incumbency advantage.

TABLE 8  
VOTING DATA: SUMMARY STATISTICS

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Democratic vote share	17,312	48	19	0	100
Incumbent vote share	17,312	66	12	0	100
Congruence	17,312	.49	.3	0	1
House election turnout	9,553	41.1	9.1	1.4	99.9
Presidential election turnout	9,553	42.3	8.7	4.1	101.9
Roll-off for House relative to president	9,553	1.2	3.6	-53.3	54.4
House election turnout (top of ticket)	999	31	9	5	71

TABLE 9  
ROLL-OFF FOR HOUSE RELATIVE TO PRESIDENT

	BASELINE		WITHIN-RACE		REDISTRICTING	
	(1)	(2)	(3)	(4)	(5)	(6)
Congruence	-.75 (.13)***	-.64 (.13)***	-.75 (.13)***	-.70 (.13)***	-.86 (.42)**	-.81 (.42)*
Presidential election turnout	.08 (.01)***	.12 (.01)***	.07 (.01)***	.10 (.01)***	.17 (.02)***	.18 (.02)***
Controls	No	Yes	No	Yes	No	Yes
Fixed effects	State × year	State × year	District × year	District × year	State × year, county	State × year, county
Observations	9,553	9,553	9,553	9,553	9,553	9,553
R <sup>2</sup>	.42	.45	.57	.58	.64	.65

NOTE.—Results are from OLS regressions. The unit of observation is county by district by election. Standard errors, clustered by county, are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

coverage driven by Congruence is specific to the congressional district. The coefficient on Congruence was never significant and was positive half of the time. For example, in the baseline specification with controls, the estimate was  $-0.18$  with a standard error of  $0.31$ .

In terms of magnitude, the estimates for the House imply that an increase in Congruence from zero to one is associated with a  $0.7$  percent fall in the roll-off in the baseline specification estimates. This is more or less what one would have guessed by looking at the graph of these variables shown in figure 1*e*. The effect amounts to roughly two-thirds of the average  $1.1$  percent roll-off in presidential election years. Again, we can relate this effect to the number of newspaper stories. Our estimates suggest that it would take around  $265$  news stories about a House

representative to raise the expected turnout in House elections to the same level as the presidential turnout during presidential election years.

While this is a large percentage decline in the roll-off, the absolute increase in turnout is not large. It is possible that the effect is larger in elections when the House election is at the “top of the ticket.” However, regressing the turnout in the House election on Congruence and including the same set of variables as in table 9, except for presidential turnout, for this subsample yields an estimated effect in the baseline regression of 0.8 with a standard error of 0.6. So it is unlikely that the impact is larger than, say, 2 percent.

Given earlier large estimated effects of media access on turnout, the moderate top of the ticket effects are somewhat surprising. Strömberg (2004*b*) estimates that the increasing use of radio in 1920–40 led to an increase in votes per capita of about 5.5 percent in gubernatorial elections. Gentzkow (2006) estimates that the increasing use of television in 1950–70 reduced House turnout in the non-South by 5.6 percent in off-year elections and 3.1 percent in presidential elections. The reason is, he argues, that people stopped reading newspapers and listening to the radio and instead turned to the uninformative television. Our estimates suggest that if local newspapers completely stopped covering House politics, then turnout would drop by less than 1 percent in presidential election years. One possible explanation for the differences is that the introduction of radio and television affected voter turnout for all offices, whereas Congruence affects only House turnout.

*Incumbency advantage.*—The electoral advantage of incumbents is one of the most studied issues in U.S. congressional politics. The dramatic increase in the incumbency advantage since the 1950s has sparked a discussion of its origins and electoral, democratic, and policy consequences. A central question in this research is why this advantage has been growing so rapidly since the 1950s. Researchers have proposed a variety of potential explanations including that the electorate has become more ideologically polarized, that incumbents have been able to create safe districts by redistricting, that incumbents control increasingly valuable resources for constituency service, and that incumbents have received increasing media exposure. We investigate a question relating to this last point. Specifically, we study whether people in areas with more media coverage of congressional politics are more likely to vote for the incumbent.

It is not obvious that voters with more information will be more supportive of incumbents. However, if pure name recall acts as a signal of candidate quality, then media coverage may increase electoral support.<sup>18</sup>

<sup>18</sup> For example, good representatives may be more active in Congress and hence receive more media coverage. See Nelson (1974) or Kihlstrom and Riordan (1984) for a similar argument for consumer product advertisements.

TABLE 10  
INCUMBENT AND CHALLENGER EFFECTS

	READ ABOUT		NAME RECALL	
	Incumbent	Challenger	Incumbent	Challenger
Congruence	.38 (.12)***	.05 (.10)	.34 (.09)***	.11 (.05)**
Observations	5,945	5,930	10,424	10,424
$R^2$	.24	.29	.29	.30

NOTE.—Results are from OLS regressions. Subsample is contested elections. All regressions include state  $\times$  year and incumbent fixed effects and controls (“baseline specification”). Robust standard errors, clustered by county, are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

The incumbency advantage may also increase if media coverage of incumbents is biased toward positive news or if media provide more precise information about incumbents and voters are risk averse. Finally, changes in representatives’ behavior induced by media coverage may influence voter support (more on this in Sec. V).

Using the ANES survey data, we first analyze whether newspapers differentially inform voters about challengers and incumbents. This can be done since the ANES records separately whether respondents correctly recalled the names of both the incumbent and the challenger running in their district. The ANES also records separately whether respondents report having read about the incumbent or the challenger. We created dummy variables for each of these four items. Incumbents are better known than challengers, and more people read about them. In contested elections with an incumbent running for reelection, about 50 percent of the respondents say that they have read about the incumbent, compared to 17 percent for the challenger; and about 29 percent can correctly name the incumbent, compared to 11 percent for the challenger.

What is the impact of the extra newspaper coverage driven by Congruence? We analyze this using data from all House elections for 1984–2004, except 1996, for which we do not have data.

Table 10 shows the results from regressions of the “read about” and name recall dummy variables on Congruence. Higher Congruence significantly increases both incumbent and challenger name recall. However, the effects are larger for incumbents than for challengers (0.34 as compared to 0.11). Moreover, while higher Congruence also significantly increases the probability of reading about the incumbent, it appears to have little effect on reading about challengers.

We now turn to voting data to see whether incumbents receive more vote support in highly congruent areas. Following the previous literature, we measure the incumbency advantage by regressing the Demo-

cratic vote share on an indicator variable for whether the incumbent House representative is a Democrat, controlling for other factors that determine the election outcome. To test whether incumbents are more advantaged in highly congruent areas, we add the interaction between the dummy variable for Democratic incumbent and Congruence. We demean the incumbency advantage and Congruence variables before interacting them, so that the coefficients on the main effects show the impact of these variables measured at their sample means. The specification has the form

$$vh_{cdt} = \beta_1 I_{dt} + \beta_2 I'_{dt} \text{Congruence}'_{cdt} + \beta_3 \text{Congruence}_{cdt} \\ + \text{NormalVote}_{cdt} + \mathbf{x}_{cdt} \delta_1 + I'_{dt} \mathbf{x}'_{cdt} \delta_2 + \alpha_{st} + \varepsilon_{cdt},$$

where  $vh_{cdt}$  is the Democratic share of the two-party vote in county  $c$  in district  $d$  in the House election at time  $t$ , and  $I_{dt}$  is a dummy variable for whether the incumbent in district  $d$  was a Democrat. The prime superscript denotes demeaned variables; for example,  $I'_{dt}$  equals  $I_{dt}$  minus the sample mean of  $I_{dt}$ . As controls,  $\mathbf{x}_{cdt}$ , we include the race, representative, county, and urbanism controls discussed in Section IV.A. We also interact the controls with the incumbency dummy variable to allow the incumbency effect to vary with the degree of urbanness and so forth.

We use two sets of variables to measure  $\text{NormalVote}_{cdt}$ , the constituencies' underlying partisan preferences. The first specification follows Levitt and Wolfram (1997) and uses a district-by-county fixed effect for each districting period. The other specification follows Gelman and King (1990) and includes the lagged Democratic vote in district  $d$  and a dummy variable for the Democrats being the incumbent party. Both specifications also include the Democratic share of the two-party vote in the presidential election in the county-district part.<sup>19</sup> Since our unit of observation is county by district by election, we can use both redistricting and within-district specifications. The results are shown in table 11.

We estimate an average personal incumbency effect of 8–12 percent (see the coefficient of the variable *Incumbent* in table 11). This estimate is similar to previous estimates in the literature. In areas where we expect the press to cover congressional politics more, the incumbency advantage is significantly higher. The interaction term between *Incumbent* and *Congruence* is positive and significant. This is true whether or not

<sup>19</sup> We have the county-by-district vote data for 1984, 1988, and 2000. For 1986 we use the presidential vote share in 1984, for 1990 we use the presidential vote share in 1988, for 1998 we use the presidential vote share in 2000, and for 1992 and 2004 we use the presidential vote share at the county level that year. For 2002 we use the county-level average vote share in 2000 and 2004.

TABLE 11  
INCUMBENCY ADVANTAGE  
Dependent Variable: Democratic Percentage of Two-Party Vote

	LEVITT AND WOLFRAM		BASELINE		WITHIN-RACE		REDISTRICTING	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Incumbent	9.21 (.23)***	10.17 (.27)***	8.29 (1.39)***	9.32 (1.25)***			10.82 (1.92)***	12.49 (1.78)***
Incumbent $\times$ Congruence	.66 (.27)**	.67 (.26)***	1.13 (.30)***	.77 (.30)**	.60 (.26)**	.74 (.26)***	1.49 (.46)***	1.25 (.44)***
Congruence	.82 (.28)***	.78 (.27)***	1.81 (.31)***	1.56 (.30)***	.65 (.27)**	.67 (.26)***	2.59 (.74)***	2.55 (.73)***
Presidential vote share	.74 (.01)***	.74 (.01)***	.66 (.01)***	.67 (.01)***	.76 (.01)***	.75 (.01)***	.61 (.02)***	.59 (.02)***
Democratic incumbent			1.35 (1.38)	.61 (1.25)			-1.19 (1.92)	-2.48 (1.77)
Lagged Democratic vote			22.90 (1.11)***	20.13 (1.13)***			19.15 (1.42)***	16.77 (1.40)***
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Fixed effects	State $\times$ year, district $\times$ plan	State $\times$ year, district $\times$ plan	State $\times$ year	State $\times$ year	District $\times$ year	District $\times$ year	State $\times$ year, county	State $\times$ year, county
Observations	17,312	17,312	14,227	14,227	14,227	14,227	14,227	14,227
$R^2$	.89	.90	.86	.87	.94	.95	.91	.92

NOTE.—Results are from OLS regressions. The unit of observation is county by district by election. Standard errors, clustered by county, are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.



we include controls and whether we use the baseline, within-race, or redistricting specifications.

As a robustness check, we substituted the Democratic vote share in the House elections with Democratic vote share in Senate elections and reran the regressions in table 11. The coefficient on Congruence was not significant, except in the redistricting specification. For example, in the baseline specification with controls, the estimate was 0.42 with a standard error of 0.26.

This increases our confidence that the estimates for the House are not spurious. However, the magnitude of the estimated effect is not large. The incumbency advantage is around 0.8 percentage points larger when Congruence is one than when it is zero. This estimate implies that an increase of the incumbency advantage by 1 percent is associated with an additional 210 newspaper articles.

The incumbency advantage in House elections has risen from less than 2 percent in the 1940s to about 8 percent today. Our estimates indicate that a relatively small share of this can be explained by changes in the media market. Given the large estimated effects on voter information, it also seems unlikely that increased voter information is a major determinant of the rise in the incumbency advantage.

## V. Representatives' Behavior in Congress

The results from the previous two sections indicate that voters in highly congruent districts are better informed about their representatives in Congress. These voters are better able to name their representatives, more willing to place them ideologically, more willing to mention something that they like or dislike about the representatives, and more willing to rate them on a feeling thermometer. They are also slightly more likely to vote in congressional races. This is reasonable since the newspaper coverage of the representatives varies greatly with Congruence, and the most commonly covered policy-related activities of the congressmen are roll call voting, advance position taking, and acting as local agents (Arnold 2004). We now explore whether news coverage influences the positions that representatives take, especially on roll calls, and the effort they devote to acting as local agents.

To provide a more concrete picture of what news coverage is like, consider the case of Representative Jack Brooks of Texas's Ninth District. Brooks represented a highly congruent district and was frequently in the press. In the 1994 election, his unpopular stance on a crime bill was extensively covered. For example, the *Houston Chronicle* reports, "Now, Stockman [the challenger] is trying to portray Brooks as being soft on the issue because the congressman supported the recently en-

acted crime bill, which bans assault weapons<sup>20</sup> and speculates about other provisions in the bill: “Was this a payoff by the Clinton administration to buy Jack Brooks’ cooperation as he ignores his pro-gun constituents?”<sup>21</sup> The paper also discusses Brooks’s performance as a local agent: “If Brooks is so powerful, where’s the pork? . . . Brooks can tick off a long list of public works projects he takes credit for bringing to the district” (“Campaign ’94”). Brooks was serving on the Judiciary Committee, with limited direct influence over grants. He was, however, actively lobbying for federal money to the district in frequent witness testimonies before congressional hearings, as we discuss below. He lost the election of 1994, and the defeat was partly attributed to his position on a crime bill.

Press coverage may help voters elect representatives with legislative preferences closer to their own and who are perhaps more competent. We will call the influence on who is in office the “selection effect” of newspapers.

Press coverage may also have “incentive effects” on representatives in office. Because they receive more press coverage, representatives from highly congruent areas might have a greater incentive to engage in constituency service and pork barrel politics. If successful, they can look forward to local newspaper stories reporting on their success—free advertising, from their point of view—and if unsuccessful, they might find that reported as well. Members representing districts with low values of Congruence will not receive much free reporting of their activities, and even though the franking privilege reduces the costs of promoting their records, self-promotion is probably viewed more skeptically than reporting by independent journalists. Similarly, representatives from highly congruent districts might have greater incentives not to cast their roll call votes against the interest of their constituency. Doing so is more likely to generate publicity and electoral loss.

In this section, we investigate whether congressional actions respond to press coverage. We study whether representatives from highly congruent areas appear more as witnesses before congressional hearings, are overrepresented on “constituency-oriented” committees and underrepresented on broad “policy-oriented” committees, and more frequently vote against their party line.

We also explore whether the effects go through selection or incentives. The effect we measure is typically the total effect through both improved selection and incentives. However, we can separately identify the incentive effect since we observe how the same representative acts over time.

<sup>20</sup> *Houston Chronicle*, “Campaign ’94; Brooks Feels Right at Home in the House; Challengers Saying Incumbent’s 42 Years in Congress Are Enough,” October 9, 1994.

<sup>21</sup> *Houston Chronicle*, “Did Pork Buy Gun Bill?” August 21, 1994.

TABLE 12  
REPRESENTATIVES IN CONGRESS: SUMMARY STATISTICS

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Congruence	4,784	.45	.24	0	1
Witness	4,890	3.54	3.54	0	28
WitnessBudget	4,890	1.55	2.20	0	21
PartyLoyalty	4,534	83.93	10.20	31.65	100
NominateScores	3,959	0	.42	-.87	1
DistribComm	4,508	.27	.44	0	1
PolicyComm	4,771	.16	.36	0	1

Practically, after we include representative fixed effects, the estimated coefficient on Congruence measures the remaining incentive effect, since the fixed effect absorbs the selection effect.

#### A. *Specification and Identification*

The level of analysis is now at the congressional district or representative level, and Congruence is now measured at this level. Suppose that  $M$  newspapers, indexed by  $m$ , sell in district  $d$ , and let  $\text{MarketShare}_{md}$  be the market share of newspaper  $m$  in district  $d$ . Then

$$\text{Congruence}_d = \sum_{m=1}^M \text{MarketShare}_{md} \text{ReaderShare}_{md}.$$

At the district level, Congruence has a mean of 0.45 and a standard deviation of 0.24 (see table 12). Our unit of analysis will be congressional district by congress. We match witness appearances, roll call voting, and committee assignments each congress with Congruence in the coming election. For example, we match witness appearances in 2001 and 2002 with Congruence computed using the district lines of the 2002 election.

We include various district controls: the percent urban and five dummy variables for urbanness, log population density, and five dummy variables for log population density intervals, one dummy variable for districts where no city contains the majority of the population, and 14 dummy variables for each total number of congressional districts in any city containing a majority of the population, the log median income, the percentage of, respectively, people aged 65 or older, military population, people employed in farming, foreign born, and blue-collar workers. We also include the representative and congressional race controls discussed in Section IV.A.

The identification concerns are similar to those discussed earlier, which is why we carefully control for urban-rural differences. Since the analysis is now at the district level, we cannot apply the within-race

specification. Further, in this section we study the effects of redistricting using fixed effects for each district by number (e.g., the Second Congressional District of Missouri). Since the district boundaries change with redistricting, these fixed effects control less well for demographic characteristics than the county fixed effects used in the redistricting specifications in the other sections. In the two large redistricting episodes in our sample period (1992 and 2002), on average, 70 percent of the population of the old district remained in the district after redistricting. In sum, the identification is not as strong in this section as elsewhere.

### *B. Witness Appearances*

One way for House representatives to advance their constituencies' interests is to appear as witnesses at congressional hearings. This is a costly activity, and on average, representatives do it only a few times per congress. To build the case that a project deserves funding, a representative may have to gather data and hire experts to discuss impacts on their district, their state, and the nation. Perhaps most important, the time spent at a hearing cannot be spent on other activities, and time is the scarcest of congressmen's resources.<sup>22</sup>

We have collected data on witness appearances by House representatives from 1982 to 2002. The variable *Witness* contains the number of appearances per congressional session by each representative. Representatives stand witness before a congressional hearing on average 3.5 times per congress. However, there is considerable variation, as the standard deviation is 3.7 (see table 12). The Appropriations and Ways and Means committees have a considerable direct influence over spending and taxes, and witness appearances before these committees may be more directly linked to influencing the allocation of funds. We therefore define the variable *WitnessBudget* as the number of appearances before the Appropriations or the Ways and Means committees. Representatives

<sup>22</sup> Jack Brooks was a frequent witness, appearing 14 times in 1994, of which eight were before the Appropriations Committee. Consider, e.g., his testimony before the House Appropriations Committee on March 23, 1994:

"Mr. Chairman, thank you for this opportunity to appear today to urge the subcommittee's favorable consideration of the public works projects for the ninth congressional district of Texas included in the fiscal year 1995 budget.

"Mr. Chairman, I support funding for all of the projects included in the budget proposal. . . . All of these federal public works projects are critical to the economic development of my district, which includes six major ports, and many oil and chemical plant operations which compose one of the largest industrial complexes in the United States. Ports along the Gulf coast are an integral part of the economy of the nation. . . . I have with me today a number of persons vitally concerned with these projects. They are here to support these statements and to answer any questions the subcommittee may have. I would like to introduce them at this time" (Lexis/Nexis, "Congressional Universe").

TABLE 13  
DEPENDENT VARIABLE: NUMBER OF WITNESS APPEARANCES BEFORE CONGRESSIONAL  
HEARINGS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Congruence	.41 (.17)**	.42 (.16)***	.41 (.15)***	.43 (.21)**	.41 (.18)**	.44 (.23)*	.38 (.22)*
District controls	X	X	X	X	X	X	X
Race and rep- resentative controls			X	X	X	X	X
Fixed effects	State, year	State, year	State, year	District, year	Rep., year	State, year	State, year
Estimation procedure	Poisson	NB	NB	NB	NB	Poisson	NB
Appearance before committee	All	All	All	All	All	Appr., W&M	Appr., W&M
Observations	4,890	4,890	4,890	4,890	4,890	4,890	4,890

NOTE.—Estimation procedure: NB = negative binomial regression; Poisson = Poisson regression. The unit of observation is House representative by congressional session. Appearance before committee: Appr. = Appropriations; W&M = Ways and Means. Standard errors, clustered by congressional district, are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

stand witness before hearings in these committees 1.7 times per congress, on average.

We want to investigate whether the extra news coverage in highly congruent districts induces representatives to stand witness more often. First, we run a Poisson regression of Witness on Congruence, including our district controls and state and year fixed effects. The results are shown in column 1 of table 13. The coefficient on Congruence in the district is significant and positive. Column 2 shows the results from estimating the same specification using a negative binomial regression (the goodness-of-fit test rejects the Poisson specification). Column 3 adds the representative and race controls. Column 4 adds district fixed effects to that specification, and column 5 instead adds representative fixed effects. Columns 6 and 7 show the results from regressions on witness appearances before the Appropriations and Ways and Means committees only.

The estimated effects are sizable. The point estimate of 0.41 implies that an increase in Congruence from zero to one increases witness appearances by 41 percent, or 1.6 appearances by congress. This is roughly what one might conclude by looking at figure 1f, which plots this relationship. A change from zero to one is extreme. However, an increase of one standard deviation increases representative appearances by 10 percent, or 0.4 appearance before all committees. The estimates imply that one additional witness appearance is associated with an ex-

ogenous increase of about 110 newspaper articles about the House representative.<sup>23</sup> Appearances before the Appropriations and Ways and Means committees are affected in the same way as appearances before all committees, in proportional terms. However, the effects are significant only at the 10 percent level. Further, since representatives make fewer appearances before these committees, the absolute effect is smaller. A one-standard-deviation increase in Congruence induces 0.2 appearance before the Appropriations and Ways and Means committees.

Regarding the other coefficients, we find significant effects of belonging to the majority party, of being a freshman, and age. Majority party representatives are 20 percent more likely to stand witness, using the specification in column 3. Freshmen are 27 percent less likely to stand witness, and older representatives are 7 percent less likely to stand witness for every 10 years of age (controlling for tenure).

It appears that the effect goes mainly through changing incentives. Once we include representative fixed effects in column 5, we investigate whether the same representative is more likely to stand witness in times when Congruence in his or her district is higher. As explained earlier, this specification estimates separately the incentive effect. This size of the effect is similar to that of the total effect estimated in the other specifications, and there is little room left for selection effects.

Representatives who are more closely monitored by the newspapers more often appear as witnesses before committee hearings. The evidence presented in this subsection shows that this correlation is significantly positive and robust across a wide range of specifications. The effects are also significant in appearances before committees with a more direct say over the budget.

### C. *Committee Choice*

We now investigate whether representatives from congruent districts more frequently serve on committees that are effective in promoting constituency interests. Congressional scholars often divide the set of committees into four categories: constituency oriented, policy oriented, prestige, and undesirable. The presumption is that representatives serving on constituency-oriented committees are better able to engage in constituency service and pork barrel politics. The opposite is true for

<sup>23</sup> As Congruence goes from zero to one, the number of articles increases by 170 and the number of appearances by  $0.43 \times 3.54$ . To get the number of articles per appearance, divide the former number by the latter.

representatives serving on policy-oriented committees, who instead are better positioned to influence national policies.<sup>24</sup>

Committee assignments are influenced by both the individual representatives and the party leadership. In the beginning weeks of the first session of every congress, new congressmen submit requests, and returning congressmen may submit requests for second assignments or transfers. On the basis of these requests, each party's committee on committees determines the committee seat allocation. The single factor regarded as most important in distributing assignments to all but the prestige committees is whether a particular place will enhance the reelection prospects of the member in question (Masters 1961). Other goals are policy influence; see Fenno (1973) for a longer list of personal goals.

We now discuss our data and present the evidence. We have the committee assignments of each representative from 1982 to 2004. While these constitute about 5,000 observations, the number of independent observations is considerably smaller since many representatives remain on the same committee across congresses. In our sample period, there are about 1,000 representatives.

Operationally, we use Deering and Smith's (1997) classification of constituency committees.<sup>25</sup> We define the dummy variable *DistribComm* to equal one if more than 50 percent of the representative's committee assignments are on constituency-oriented committees, and zero otherwise. This is true for about 28 percent of the representative-year observations. We also construct the variable *PolicyComm*, which equals one if the representative serves on the House Judiciary Committee or the International Relations/Foreign Affairs committees. This variable is one for about 15 percent of the representative-year observations.

Committee assignments have been found to correlate with district demographics, such as the population share residing in urban areas and the share of the labor force employed in the armed forces or in agriculture (e.g., Rohde and Shepsle 1973). These variables are included in our district controls.

Our results from regressions of committee assignments on Congruence are presented in table 14. Column 1 shows that Congruence is

<sup>24</sup> Appropriations, Budget, Rules, and Ways and Means are designated as "prestige" committees. See Fenno (1973) for a detailed discussion and early classification. See, e.g., Baumgartner, Jones, and MacLeod (1997), Thorson, Glieden, and Lina (1999), and Frisch and Kelly (2002) for recent papers using similar classifications.

<sup>25</sup> Before the 104th Congress: Agriculture; Armed Services; Interior and Insular Affairs (Natural Resources in the 103rd Congress); Merchant Marine and Fisheries; Public Works and Transportation; Science, Space, and Technology; Small Business; and Veterans Affairs. In and after the 104th Congress, we designate the following as constituency committees: Agriculture, National Security, Resources, Science, Small Business, Transportation and Infrastructure, and Veterans Affairs.

TABLE 14  
COMMITTEE ASSIGNMENTS

	DEPENDENT VARIABLE					
	Distributive Committee Assignment			Policy Committee Assignment		
	(1)	(2)	(3)	(4)	(5)	(6)
Congruence	.41 (.07)***	.15 (.09)	.05 (.08)	-.18 (.06)***	-.07 (.08)	-.21 (.07)***
Controls	No	Yes	Yes	No	Yes	Yes
Fixed effects	State × year	State × year	Year, district	State × year	State × year	Year, district
Observations	4,508	4,508	4,508	4,771	4,771	4,771
R <sup>2</sup>	.18	.37	.56	.12	.24	.54

NOTE.—Results are from OLS regressions. The unit of observation is House representative by congressional session. Standard errors clustered by House representative are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

positively and significantly correlated with *DistribComm*, including only fixed effects for each year-state combination. In all specifications, the standard errors are clustered by representative. However, when we add the district, representative, and race controls, *Congruence* loses significance (see col. 2). Column 4 uses district fixed effects with controls. *Congruence* is insignificant in this specification. Columns 4–6 replace *DistribComm* with *PolicyComm* as the dependent variable. Policy committee assignments are negatively correlated with *Congruence* and significantly so in all specifications but one.

To sum up, we find weak evidence that *Congruence* affects committee assignments. *Congruence* is negatively correlated with being on a policy committee, but this relationship is significant in only some specifications. The effect of being on a distributive committee is positive but insignificant except in the most basic specification. This might reflect a low statistical power because of the high persistence in assignments. The variable *DistribComm* changes between congresses for only 7 percent of the representatives. A larger fraction, 22 percent, of representatives change their *PolicyComm* value between congresses.

#### D. Roll Call Voting

Jack Brooks's vote in favor of gun control was in step with his party's leadership, but not with his constituency. In general, when determining whether to vote for or against a particular bill, elected officials must balance the wishes of the overall electorate, specific constituencies within the electorate, pressure from party leaders within the Congress, and their own ideology. We hypothesize that representatives in more



TABLE 15  
DEPENDENT VARIABLE: PERCENTAGE OF ROLL CALL VOTES WITH PARTY LEADERSHIP

	(1)	(2)	(3)	(4)	(5)
Congruence	-5.38 (2.06)***	-4.75 (2.03)**	-4.65 (2.21)**	-6.75 (2.63)**	-3.27 (1.40)**
District controls	X	X	X	X	X
Race and representative controls		X	X	X	X
Fixed effects	State, year	State, year	State × year	District, state × year	Rep., state × year
Observations	4,534	4,534	4,534	4,534	4,534
R <sup>2</sup>	.19	.32	.38	.68	.91

NOTE.—Results are from OLS regressions. The unit of observation is House representative by congressional session. Standard errors, clustered by congressional district, are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

congruent districts vote more in line with constituency interests because their constituencies are better able to monitor them. Since constituency and party leadership interests sometimes diverge, this implies that representatives in these districts vote less frequently with their party leadership.

We first investigate this party loyalty in roll call voting. We define the variable *PartyLoyalty* as the percentage of all roll call votes during each congress in which the representative votes in the same way as a majority of the party leadership.<sup>26</sup> We have data on party loyalty from 1982 to 2002. The mean of *PartyLoyalty* is 84 percent. Figure 1g shows graphically how *PartyLoyalty* declines with *Congruence*.

To explore this relationship more carefully, we regressed *PartyLoyalty* on *Congruence*. Table 15 reports the results. The regression in column 1 includes our district controls as well as state and year fixed effects. The specification in column 2 adds the race and representative controls, and that in column 3 adds state by year fixed effects. Columns 4 and 5 adds fixed effects for the congressional district and House representative, respectively.

The estimated coefficient on *Congruence* is always negative and statistically significant at the 5 percent level. We estimate that a one-standard-deviation increase in *Congruence* lowers *PartyLoyalty* by 1 percent. This amounts to around 10 extra roll call votes against the party leadership since the average congressman cast slightly less than a thousand votes per congress during our sample period. We can again relate this to the number of articles generated by *Congruence*. Four exogenously

<sup>26</sup> Our definition of party leaders includes the speaker, the party leaders, whips, and caucus chairs and the chairs of the Democratic National Convention Committee and the Republican National Convention Committee.

generated newspaper articles about the congressman are associated with one extra vote against the party leadership. We also explored two other closely related measures of party loyalty, the share of votes with the majority of the party members and the share of such votes in the subset of close elections. The results are very similar.

Our estimates suggest that the effect on party loyalty goes through both selection and incentives. The specification in column 4 estimates the combined selection and incentive effects within a congressional district over time. The estimate implies that an increase in Congruence from zero to one lowers party loyalty by 6.8 percent. The estimate in column 5 suggests that 3.3 percent of this reduction is due to incentive effects since it estimates the incentive effects within legislators over time. Perhaps selection matters here since party loyalty to a large extent is driven by the individual representatives' fixed ideological preferences. It is less clear why there would be similar fixed differences in the ability or willingness to stand witness before congressional hearings, which may explain why selection plays little role for that outcome.

We now shift the focus to the ideological dimension of roll call voting. There is some empirical evidence that representatives' voting is typically more ideologically extreme than what their constituencies would prefer. A number of studies find a significant negative correlation between vote support and representatives' "ideological extremism" in roll call voting (e.g., Canes-Wrone, Brady, and Cogan 2002). In a related vein, Ansola-behere, Snyder, and Stewart (2001) find that the ideological gap between Republican and Democratic candidates is smaller in races that are expected to be close. This presumably occurs because the competition for votes induces representatives to place more weight on constituency interests than on party and personal interests.

We test whether the ideological gap between Republican and Democratic representatives' voting is smaller in highly congruent districts. To measure the ideological position of the representatives, we use NOMINATE scores, constructed by Poole and Rosenthal (1997). NOMINATE is a nonlinear latent variable model, somewhat akin to a factor analytic model, used to estimate the underlying ideology that drives observed roll call behavior. Roughly speaking, it assigns an ideological position to each legislator in order to correctly predict as many roll call votes as possible. The range of scores is  $[-1, 1]$ , and scores are increasing in conservativeness. The first-dimension NOMINATE scores correlate well with other measures of ideology, such as Americans for Democratic Action (ADA) scores. We define the variable *NominateScores* as the first-dimension ideal point estimates from DW-NOMINATE.<sup>27</sup>

<sup>27</sup> See Poole and Rosenthal (1997) for an exact definition of the statistical model underlying NOMINATE and DW-NOMINATE, as well as a discussion of the advantages of

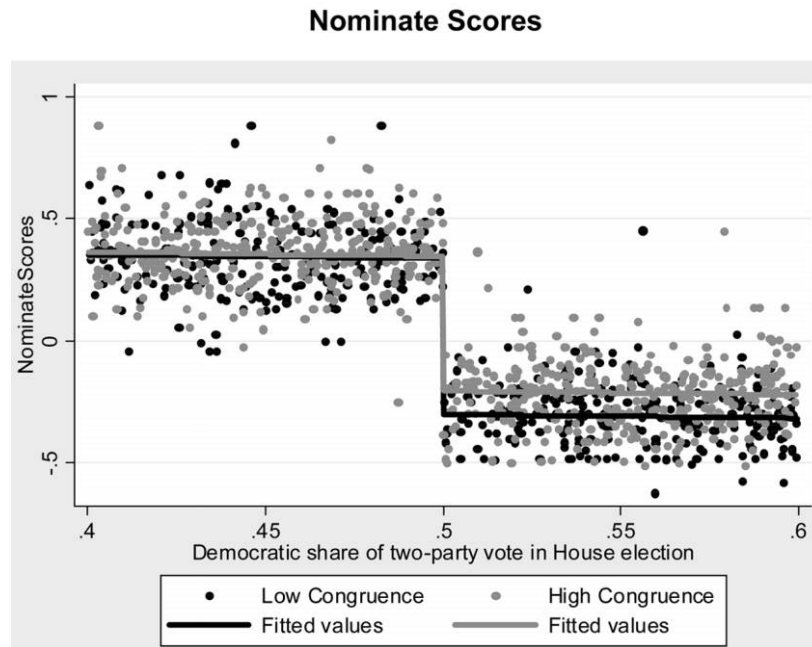


FIG. 4.—Nominate scores by Congruence

We have data on NOMINATE scores for House representatives for 1982–2004. Figure 4 plots these scores against the share of voters who supported the Republican candidate for the House election in the congressional district. Scores from districts in which Congruence is above (below) the median are in grey (black). The solid lines show the predicted values from separate linear regressions of Nominate scores on Democratic vote shares and a Democrat wins dummy variable within the two subgroups. The gap in voting is smaller in the highly congruent districts. In other words, representatives are more moderate in their voting behavior in these districts. The same relationship is apparent in the “party loyalty” scores, which is not surprising since ideologically extreme representatives tend to be those who vote consistently with the party line.

We analyze these differences in roll call voting using a specification similar to that in Lee, Moretti, and Butler (2004). This specification compares the Nominate scores of Republican and Democratic representatives who won or lost a seat by a small margin. This specification is useful because it tests whether politicians with very similar constitu-

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NOMINATE over other techniques and indices. We also did the analysis using ADA scores, with very similar results.

TABLE 16  
DEPENDENT VARIABLE: NOMINATE SCORES FIRST DIMENSION

	(1)	(2)	(3)	(4)	(5)
(Democrats win) ×					
Congruence	.18 (.05)***	.16 (.05)***	.18 (.06)***	.16 (.05)***	.15 (.06)***
Democrats win	−.75 (.03)***	−.75 (.03)***	−.81 (.08)***	−.75 (.03)***	−.80 (.09)***
Congruence	−.04 (.04)	−.09 (.04)**	−.09 (.05)*	−.06 (.04)	−.04 (.04)
Controls	No	Main	Main, urban interacted	No	Main, urban interacted
Fixed effects	No	No	No	Year, district	Year, district
Observations	3,959	3,959	3,959	3,959	3,959
R <sup>2</sup>	.87	.90	.90	.96	.96

NOTE.—Results are from OLS regressions. The unit of observation is House representative by congressional session. All specifications control for fifth-order polynomials in Democratic vote share in the House and presidential elections. The “main” controls denote the direct effect of all our control variables. The “urban interacted” controls denote interaction between the Democrats win dummy variable and share urban, density, and the 10 dummy variables for urban and density. Standard errors, clustered by congressional district, are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

encies act differently. If voters can perfectly discipline their representatives, then we should see “full moderation,” in which politicians adopt identical platforms (Downs 1957). At the other end of the spectrum, voters may not be able to moderate politicians at all. We test whether media coverage of politicians increases the degree of moderation.

The dependent variable is *NominateScores*. The key independent variables are *DemocratsWin*—a dummy variable indicating that the Democratic candidate won the election—*Congruence*, and the interaction of *DemocratsWin* and *Congruence*. The interaction allows the jump in *NominateScores* at 50 percent Democratic votes to vary with *Congruence*. A positive interaction coefficient implies that the negative jump at 50 percent is lower for more congruent districts. We also include fifth degree polynomials in Democratic vote shares in the House and presidential elections to account for any continuous influence on *Nominate* scores. The presidential vote share is interpolated for years in which there was no presidential election. We limit the sample to elections in which both parties had at least a 1 percent vote share.

The results are presented in table 16. Column 1 contains only the above-mentioned variables. There is an estimated drop of  $-0.75$  in *NominateScores* when a Democrat is elected instead of a Republican (at zero *Congruence*). The drop is  $-0.57$  ( $-0.75 + 0.18$ ) when *Congruence* is one. Column 2 adds the district, race, and representative

characteristics discussed above. This causes the estimated coefficient on the interaction term to fall to 0.16.

Because the drop may depend on district urbanism, we interact the dummy variable for the Democratic candidate winning not only with Congruence but with the percent urban and five dummy variables for urbanness, the log population density, and five dummy variables for log population density intervals. The estimated coefficient on the interaction term is not much affected (see col. 3). Because we interact with our urbanism controls, the direct effect of the Democratic candidate winning does not have the same interpretation as in columns 1 and 2. Column 4 includes congressional district and year fixed effects. This specification identifies the coefficient on Democratic victory only through districts in which the party in power has changed. Column 5 adds the controls and Democratic win dummy variable interacted with district urbanness. The interaction term remains significantly positive. Note that we cannot separate selection and incentive effects in this analysis. By construction, Nominate scores are essentially constant for each representative over time, and including representative fixed effects in this regression leaves nothing to explain.

We find that the extra news coverage induced by higher Congruence makes representatives' roll call votes less ideologically extreme. The ideological distance between Democratic and Republican representatives' roll call voting is about 21 percent lower ( $.16/.75 = .21$ ) in perfectly congruent than in perfectly noncongruent areas. This is consistent with the hypothesis that representatives moderate their behavior in highly congruent districts because the better monitoring of the newspapers increases the electoral costs of ideologically extreme or highly partisan roll call voting.

## VI. Policy

We have argued that representatives who are closely monitored by local newspapers have a greater incentive to provide services to their constituency. We have also provided some evidence that representatives react to these incentives, appear more as witnesses before congressional hearings, and display less extreme roll call voting patterns. If the representatives' efforts in Congress are successful, then we should observe more federal funds flowing into highly congruent districts and to more congruent counties within districts.

To test this, we assembled data on federal expenditure allocations across counties from the Consolidated Federal Funds Report. The expenditures we analyze include grants, procurement contracts, salaries and wages, direct payments for retirement and disability, and other direct payments. We exclude loans, insurance, and social security pay-

ments.<sup>28</sup> The expenditures are in constant 2000 dollar values. The total value of the expenditures we study is about \$2,700 per capita, or about 10 percent of U.S. GDP. We have these data yearly for the period 1983–2004. However, we collapse the data by congressional session and study mean annual expenditures per congress. We define the variable Spending as the (log of) this mean annual spending per congress.

Since the unit of analysis is now counties and some counties cross district boundaries, we average the variables containing district controls. We compute the population-weighted average Congruence<sub>cd</sub> in a county as

$$\text{Congruence}_c = \sum \frac{n_{cd}}{n_c} \text{Congruence}_{cd},$$

where  $n_{cd}/n_c$  is the share of the population of county  $c$  that lives in district  $d$ . Similarly, we compute the population-weighted averages of district-level variables such as representative seniority, committee assignments, and so forth and use them in the regressions.

Table 17 shows the results of a set of regressions of Spending on Congruence. We apply the baseline, within-race, and redistricting specification with and without our sets of county, urbanism, representative, and race controls. We also include a dummy variable for the county containing the state capital. Once more, it is important to control for the urban dimension since it correlates with both federal spending and Congruence. In the within-race specification, we look only at counties that lie entirely in one district. We also add a “within neighbor counties” specification in which each county that lies along a district border has been matched with the closest county on the other side of the border. This specification includes dummy variables for each such neighbor pair.

The coefficient on Congruence is significantly positive in all specifications that use cross-sectional variation (which is all but the last two). When we compare counties within the same district and year, significantly more funds were spent in more congruent counties. When we compare neighboring counties on different sides of district borders, significantly more funds were spent in the more congruent neighbor. The estimated effect is consistently about 0.1, which implies that a shift in Congruence by one standard deviation is associated with a 3 percent increase in spending.

In the redistricting regression, the coefficient on Congruence<sub>c</sub> is significant only at the 10 percent level after controls are added. The size

<sup>28</sup> The loans data do not report the value of the loan subsidy but only the total value of the loan, the insurance data report total obligations rather than payments, and the social security data are excluded because representatives are unlikely to affect its distribution.

TABLE 17  
DISTRIBUTION OF FEDERAL FUNDS ACROSS COUNTIES, 1984–2004  
Dependent Variable: Log Spending per Capita

	BASELINE		WITHIN-RACE		WITHIN NEIGHBOR COUNTIES		REDISTRICTING	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Congruence	.092 (.030) ***	.137 (.027) ***	.064 (.030) **	.094 (.030) ***	.106 (.039) ***	.096 (.038) **	.051 (.021) **	.035 (.020) *
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Fixed effects	State × year	State × year	District × year	District × year	Year, neighbor	Year, neighbor	State × year, county	State × year, county
Observations	33,085	33,085	28,787	28,787	16,698	16,698	33,085	33,085
R <sup>2</sup>	.259	.393	.441	.516	.638	.677	.8	.890

NOTE.—Results are from OLS regressions. The unit of observation is county by congressional session. Standard errors, clustered by county, are in parentheses.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

of the coefficient also drops to 3–5 percent. The reason, we believe, is that there is a very high inertia in spending. Much of the funding that the government spends in a given year was authorized in previous sessions of Congress since the total money allocated is the sum of continuing awards still in existence as well as new funds being awarded that year. For this reason, the stock of spending is less related to congressional action in any given year. It may be possible to address this issue by using data that identify new awards by year, such as the U.S. Domestic Assistance Programs Database used by Bickers and Stein. We leave this for future work.

In sum, we find considerable evidence that media coverage substantially influences federal spending. This is the last link in the accountability chain. Our results on news coverage, voter information, politicians' actions, and policy consistently support the idea that an active media coverage of politics increases electoral accountability.

## VII. Discussion and Conclusion

All is not safe, even where the press is free and every person is able to read. The press must also have economic incentives to cover politics. Those incentives might be muted by a poor fit between media markets and political districts. Stated from the positive side, we find that a good fit (high Congruence) between newspaper markets and congressional districts leads to more press coverage of the local congressmen. In areas where coverage is high for this reason, voters are better informed about their congressmen and more likely to participate in elections. Politicians respond to the increased media coverage by more actively pursuing their constituencies' interests. They moderate their partisan voting, more frequently stand witness before committee hearings, and (perhaps) more frequently work on constituency committees. As a result, we see more federal money flowing into more congruent districts.

Quantitatively, the effects of news coverage on voter information, politicians' actions, and policy are large. We estimate that increasing Congruence by one standard deviation induces around 50 additional newspaper articles about the House representatives per congress, it increases voters' ability to correctly name the candidates in the House race by 10 percent and their willingness to describe and rate the representative by 6–8 percent, it increases the representatives' witness appearances by 10 percent, and it reduces the gap between Republican and Democratic ideological differences in voting by 5 percent. Finally, it increases federal spending per capita by 3 percent. Effects on voter participation and the incumbency advantage are significant but not large.

The results can be related to the number of newspaper articles. The share who can correctly name their House representative increases by



1 percent for every four exogenous additional newspaper articles about the representative. Given that newspaper readership in our sample period is 60 percent and that people read about one-fourth of the articles in a newspaper, the estimated average effect is a 1.4 percent increase in name recall among those previously uninformed per article that is read. Similarly, there is one additional witness appearance per 100 additional newspaper articles and one additional vote against the party leadership per every four exogenous additional newspaper articles about the House representative.

Our findings support the idea that press coverage is important for electoral accountability. Voters need information to keep politicians accountable, and the press delivers this information. This was the belief of the framers of the Constitution, and that information improves accountability is also a standard feature of political agency models (see Persson and Tabellini 2000; Grossman and Helpman 2001). The U.S. House districts constitute a suitable testing ground for this idea. While the districts are of similar size and political competence, press coverage varies (we argue) exogenously with the Congruence between media markets and congressional districts. Moreover, the importance of the U.S. House makes the welfare consequences of public action or inaction of high order.

Our results are helpful in understanding the political consequences of trends in media markets. At the start of the twentieth century, every large and medium-sized U.S. city and even many small towns had at least one newspaper geared to local political needs. The number of newspapers has shrunk so that many communities no longer have a paper of their own. Newspapers have merged and been replaced by broadcast media, serving even larger regions. This trend is likely to decrease the congruence at local levels. This might affect the congruence not only of congressional districts but also of municipalities, counties, and other local government units. Our results suggest that this is likely to reduce voter information, political participation, and political accountability.

The Internet may influence this trend. Already at this stage, more than 1,300 domestic daily newspapers have a Web presence, and 15 percent of all American adults say that the Internet was the primary source of campaign news during the 2006 election (compared to 34 percent for newspapers; PEW Research Center 2007). The effect on information about local politics is unclear. On the one hand, there is a low fixed cost of starting an Internet outlet, basically no space constraint, and good search technologies. This should increase the number of viewable relevant articles. On the other hand, most people probably do not search intensively for information about local politics; rather they get this information as a by-product. In addition, the cost of gath-

ering, editing, and writing news is the same for print and online editions, and these costs make media write more about issues that concern larger shares of their readership. Moreover, since the potential Internet audience is global, local reader shares may decrease.<sup>29</sup>

Because of the large effects, congruence should be an important factor to consider in contemplating the regulation of the press to improve voter information and political accountability. It may be even more important than, say, the degree of competition between local newspapers. There exists an externality argument for why congruence may be too low. Better-informed voters induce politicians to work more for their constituencies, which benefits all voters. However, individual voters do not fully internalize these benefits, and consequently, their willingness to pay for political information is low (see Downs 1957). This causes media markets to conform too little to political districts.

Note that our results may generalize to media coverage of issues. In the same way that representatives work more for geographical constituencies that are better informed, they may also work more for better-informed issue-defined constituencies (such as minorities, environmental groups, or people who care strongly about taxes). If our results generalize in this way, they have wide-ranging implications. The media coverage of issues varies greatly across issues in a systematic way. This could create a systematic policy bias disfavoring minority groups and groups not valuable for advertisers (see Strömberg 2004a; Oberholzer and Waldfogel 2009).

Finally, as an application, the strong “personal vote” in U.S. elections might in part be due to the local nature of much newspaper coverage and could therefore be affected by these trends. Today, relatively few voters in the United States read a “national” newspaper; rather, almost everyone who reads a newspaper reads a local paper. In 2003, the combined circulation of the three largest newspapers—the *New York Times*, the *Wall Street Journal*, and *USA Today*—was 6 million out of a total circulation in the United States of 50 million, or just 12 percent. In many other countries, the opposite is true. Citizens in these countries are therefore unlikely to encounter much news about their local politicians. This is even the case in countries with geographically defined constituencies, such as the United Kingdom.

<sup>29</sup> The United Kingdom’s *Guardian* newspaper receives 78 percent of its Web readers from overseas, compared to 30 percent for the *New York Times* and 17 percent for the *Washington Post* (Thurman 2007). The concentration in online media use is also very high. Although thousands of sites contain information on any given topic, only a few sites account for most of the traffic. For example, three old media-related sites—MSNBC, CNN, and the *New York Times*—account for three-quarters of traffic online for U.S. news (Barnhurst 2002).

## Appendix

### Computation of Congruence

We compute Congruence as follows. We use the newspaper sales data to estimate the number of people in each district that read each newspaper. (Although we estimate this separately for each year in our sample, we suppress time subscripts in what follows.) Let  $n_{cd}$  be the number of people who live in county  $c$  and congressional district  $d$ , let  $n_c = \sum_d n_{cd}$  be the total number of people who live in county  $c$ , and let  $n_d = \sum_c n_{cd}$  be the total number of people who live in district  $d$ . Let  $x_{mc}$  be the number of copies of newspaper  $m$  sold in county  $c$ , and let  $x_m = \sum_c x_{mc}$  be the total number of copies sold of newspaper  $m$ . Assume that the number of copies per capita of newspaper  $m$  is the same in the part of county  $c$  that lies in district  $d$  as for the county as a whole (we do not have data on newspaper sales for subcounty units). Then the number of copies of newspaper  $m$  sold in the part of county  $c$  that lies in district  $d$  is approximately

$$x_{mcd} = \frac{x_{mc}}{n_c} n_{cd}. \quad (\text{A1})$$

Also, the number of copies of newspaper  $m$  sold in district  $d$  is approximately  $x_{md} = \sum_c x_{mcd}$ . These variables can then be used to compute  $\text{MarketShare}_{mc}$ ,  $\text{ReaderShare}_{md}$ , and  $\text{Congruence}_{cd}$  using the definitions

$$\text{MarketShare}_{mc} = \frac{x_{mc}}{\sum_{m'} x_{m'c}}$$

and

$$\text{ReaderShare}_{md} = \frac{x_{md}}{x_m}.$$

Combining these, we use equation (3) to compute  $\text{Congruence}_{cd}$ .

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