Mobile Broadband and the Decline of Incumbency Advantage

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Abstract

Incumbency advantage in U.S. congressional elections has long been a well-established feature of American politics. Using a regression discontinuity design, we document that this advantage remained stable until the late 2000s, after which it sharply declined, falling from about 11 percentage points of additional vote share to about 3. Using a differences-in-discontinuities design, we show that the expansion of mobile broadband can account for at least half of this decline. Incumbency advantage decreased both for Democrats and Republicans, although it was initially greater for incumbents from the current president's party. Mobile broadband increased voters' knowledge of both incumbents and challengers, raised disapproval of incumbents, and enhanced challengers' fundraising capacity.

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I Introduction

For decades, the incumbency advantage in U.S. congressional elections has been among the most consistent and well-documented findings in political science. Incumbent members of Congress have historically enjoyed substantial electoral advantages, supported by name recognition (Druckman et al., 2020), fundraising networks and campaign spending (Levitt, 1994; Levitt and Wolfram, 1997; Fouirnaies and Hall, 2014), institutional resources (Fiorina, 1977), and voter responsiveness to candidate-specific traits (Cox and Katz, 1996; Ansolabehere et al., 2000).[1] Using increasingly credible research designs, previous work has shown that congressional incumbents consistently received about 10 percentage points more vote share than otherwise comparable challengers, implying roughly a 50 percentage point higher probability of winning the next election (Gelman and King, 1990; Cox and Katz, 1996; Lee, 2001, 2008).

Yet an important feature of this literature is that the data used in these studies end before the spread of mobile broadband internet. This timing is potentially consequential. A growing literature shows that mobile broadband reshaped political equilibrium in other democratic settings: in Europe, it eroded support for mainstream parties and strengthened populist opposition (Guriev et al., 2021; Manacorda et al., 2026), while globally it reduced confidence in incumbent governments (Guriev et al., 2021). These findings strongly suggest that mobile broadband can weaken established political actors by accelerating the diffusion of negative political information about incumbents, amplifying criticism of the status quo, and lowering barriers to political mobilization by the opposition. If mobile broadband also reshapes political equilibrium in the United States, this adjustment cannot take the form of new-party entry. Instead, it should unfold within the existing party system, weakening incumbents, strengthening challengers, and thereby reducing incumbency advantage. Recent electoral developments are consistent with this view. An increasing number of prominent incumbents have lost reelection, including six-term incumbent Matt Cartwright in 2024 and five-term incumbent Sean Patrick Maloney, then chair of the Democratic Congressional Campaign Committee, in 2022. In New Hampshire's 1st Congressional District, control shifted four times during the 2010s between Democrat Carol Shea-Porter and Republican Frank Guinta. Together, these developments suggest that incumbency no longer secures electoral success to the extent it once did.

This paper is the first to document, using the regression discontinuity design developed by

[1] Although gerrymandering is often cited as a contributor to incumbency advantage, the literature provides little supporting evidence (Gelman and King, 1994; Ansolabehere et al., 2000).

Lee (2008), the decline in incumbency advantage in U.S. congressional elections since the late 2000s, and to study its underlying causes. We begin by confirming the central finding of the earlier literature: before the late 2000s, incumbents enjoyed a vote-share advantage of about 10 percentage points. We then show that this advantage remained stable only until the late 2000s, after which it declined sharply, reaching about 3 percentage points by the early 2020s. We next use a differences-in-discontinuities event-study design, building on Lee (2008) and Sun and Abraham (2021), to show that the spread of mobile broadband can account for at least half of this decline. In line with the staggered rollout of 3G across congressional districts, incumbency advantage falls after districts receive mobile broadband, with no evidence of pre-trends. By contrast, the decline is not explained by other contemporaneous shocks, including the Great Recession, as captured by increase in local unemployment and decline in housing prices. We also show that the results are robust to controlling for incumbent party by election fixed effects and, to account for all time varying factors, we use survey data and show that incumbents got lower and challengers higher political support in localities covered by mobile broadband compared to areas not covered within the same congressional race. To address potential time-varying confounders, we show that the results are robust to the inclusion of incumbent-party-by-election fixed effects. We also use survey data to compare localities with and without mobile broadband coverage within the same congressional race, and find that covered localities had lower support for incumbents and higher support for challengers.

We then extend the Lee (2008) framework to develop a measure of party-specific incumbency advantage. We show that, once mobile broadband became ubiquitous, incumbency advantage declined for both Democratic and Republican incumbents. The decline, however, initially was larger for incumbents from the president's party. This difference in timing is also linked to mobile broadband: its expansion disproportionately reduced the advantage of Republican incumbents in 2008 and Democratic incumbents in 2010, that is, incumbents from the president's party in each election.

Finally, we examine two channels through which mobile broadband disadvantaged incumbents and benefited challengers in congressional elections: information and campaign finance. We find that it increased disapproval of incumbents, improved voters' knowledge of both incumbent and challenger candidates, and substantially strengthened challengers' fundraising capacity, especially among small contributors. Overall, mobile broadband appears to have narrowed both informational and financial gaps between incumbents and challengers.

By documenting the recent decline in incumbency advantage in U.S. congressional elections and showing that the spread of mobile broadband accounts for a substantial part of this decline, we contribute to two literatures.

First, we contribute to the literature on incumbency advantage in the United States. Earlier work documented a persistent and sizable incumbency advantage in congressional elections before the mobile broadband era (Cox and Katz, 1996; Gelman and King, 1990; Lee, 2001, 2008).[2] While political scientists have noted a recent weakening of incumbency-related electoral protection (Jacobson, 2015, 2021; Rogers, 2023), these studies focus on the advantage of individual candidates relative to their party and therefore overlook party-level incumbency advantage. Our paper is the first to document the decline in party-level incumbency advantage using the regression discontinuity framework of Lee (2008). We also contribute by developing a method to estimate incumbency advantage separately for the two parties and by showing that its decline affected incumbents from both parties when mobile broadband became ubiquitous.

Second, we contribute to the literature on the political effects of mobile broadband internet. Previous research shows that mobile broadband and the social media it enabled affect politics through multiple mechanisms (see surveys by Zhuravskaya et al., 2020; Aridor et al., 2024). By making fast internet access available directly on smartphones, mobile broadband increased time spent online and accelerated the diffusion of social media. This gave challengers and opposition voices new ways to reach voters, expose corruption and incompetence, and mobilize supporters (Enikolopov et al., 2018; Guriev et al., 2021; Enríquez et al., 2024). Social media also improved challengers' fundraising prospects, further lowering barriers to political competition (Petrova et al., 2021). At the same time, by prioritizing divisive, negative, and emotionally charged content, social media platforms may have increased criticism of the status quo and worsened attitudes toward incumbents (Haidt and Rose-Stockwell, 2019; Guess et al., 2023; Milli et al., 2025; Kätsyri et al., 2016; Brady et al., 2017; Beknazar-Yuzbashev et al., 2024, 2025; Braghieri et al., 2024; Robertson et al., 2023). Consistent with these mechanisms, Guriev et al. (2021) show that mobile broadband lowered confidence in governments globally, while Manacorda et al. (2026) and Melnikov (2025) document major political consequences in Europe and the United States. Our paper links this technological change to a central feature of American electoral politics: incumbency advantage.

The rest of the paper is structured as follows. Section II describes the data used in this study. Section III outlines the identification strategy. Section IV presents the empirical findings.

[2] Fowler and Hall (2014) found a similar magnitude of advantage in state legislative elections through 2008.

Section V concludes.

II Data

This section describes the main data sources used in the analysis. Appendix Section A.I provides further details and definitions of secondary variables. Appendix Table A1 presents summary statistics for all variables used in the analysis.

U.S. congressional elections.— We use data from the MIT Election Data and Science Lab, which cover congressional elections from 1976 to 2022, and from Dave Leip's Atlas of U.S. Presidential Elections for 2024. Both sources report candidate-level information, including party affiliation, vote counts, and total votes cast, disaggregated by congressional district and year. From these data, we construct vote shares for the two major parties in each district-year and identify the party controlling each district in each period. Our main dependent variable is the Democratic party two-party vote share (the number of votes received by the Democratic candidate divided by the total votes received by Democratic and Republican candidates).

Mobile broadband coverage.—We measure mobile broadband internet coverage from 2007 to 2023 using annual maps from Collins Bartholomew's *Mobile Coverage Explorer*, which collects data from operators using the GSM (Global System for Mobile Communications) standard. The two largest operators in this dataset are AT&T and T-Mobile, together accounting for more than half of the U.S. mobile market (Statista, 2023). From the iPhone's launch in 2007 until 2011, AT&T held an exclusivity agreement with Apple, requiring all U.S. iPhone users to subscribe to AT&T.

The dataset provides 1×1-kilometer grid cells indicating the presence of 3G, 4G, or 5G coverage (collectively referred to as "mobile broadband"). From these data, we compute the share of each congressional district's population with mobile broadband coverage in each year. Appendix Figure A1 maps mobile broadband expansion in the contiguous United States for two-year periods aligned with congressional elections between 2008 and 2014. Appendix Figure A2 reports the evolution of the distribution of districts by the share of population with access to mobile broadband in this period. By 2011, all congressional districts had at least some GSM 3G coverage.

In the early years of mobile broadband, Verizon and Sprint—the two other major U.S. mobile operators—used the alternative CDMA standard for mobile internet provision, which is not covered in the *Mobile Coverage Explorer*. On CDMA devices, user identification with the carrier is performed not via a SIM card, as on GSM devices, but through the hardware of the device

itself, effectively tying Verizon and Sprint customers to the phones that they initially purchased. Although CDMA internet coverage was widely available across the United States before the rollout of GSM 3G networks, Verizon and Sprint customers could not take full advantage of internet due to the inferiority of early CDMA-compatible devices (e.g., Motorola Droid, BlackBerry Bold 9650, HTC Hero). These were primarily designed for SMS texting, emailing, and limited browsing, making them poorly suited for social media use or sharing images and videos. Early CDMA devices did not support simultaneous voice and data, lacked many of the iPhone's innovative features, and offered far fewer apps than Apple's App Store (Ganapati, 2009; Hardy, 2010). The first modern CDMA-compatible smartphone in the United States was the iPhone 4S, introduced by Sprint and Verizon in 2011, when all U.S. congressional districts already had GSM mobile broadband.[3]

Cooperative Election Study (CES).—To analyze individual-level voting behavior, disapproval of the incumbents, and voters' knowledge of congressional candidates' policy positions, we draw on data from the Cooperative Election Study (CES) (Ansolabehere and Schaffner, 2024). For voting behavior, we use the Cumulative CES Common Content file (Kuriwaki, 2024). For knowledge of candidates' policy positions, we harmonized and cleaned the original CES surveys from 2006 to 2024.

Campaign Contributions.—The data on individual campaign contributions come from the Database on Ideology, Money in Politics, and Elections (DIME) (Bonica, 2024), which covers the period from 1980 to 2010.

III Empirical Methodology

We estimate the party incumbency advantage using a regression discontinuity design (RDD) following Lee (2001, 2008). To trace the dynamics of incumbency advantage, beginning with the 1976 election cycle, we divide the sample into seven consecutive six-year periods, excluding redistricting years.[4] For each period, we estimate the following specification:

$$\begin{aligned} DemVote_{i,t} = \alpha_0 + \alpha_1\, DemWon_{i,t-1} + \alpha_2\, DemMargin_{i,t-1} \\ + \alpha_3\, DemMargin_{i,t-1} \times DemWon_{i,t-1} + \tau_t + \delta_i + \varepsilon_{i,t}, \end{aligned} \tag{1}$$

[3]See Appendix Section A.I for more details about CDMA networks.

[4]The elections included in each period are: Period 1: 1976, 1978, 1980; Period 2: 1984, 1986, 1988; Period 3: 1990, 1994, 1996; Period 4: 1998, 2000, 2004; Period 5: 2006, 2008, 2010; Period 6: 2014, 2016, 2018; Period 7: 2020, 2024. Including redistricting years (1982, 1992, 2002, 2012, 2022) yields similar results.

where i indexes congressional districts and t indexes election years. The dependent variable $DemVote_{i,t}$ is the Democratic candidate's two-party vote share.[5] The main regressor $DemWon_{i,t-1}$ is an indicator for whether the Democrat won the previous election (i.e., incumbency status). The running variable $DemMargin_{i,t-1}$ is the Democrat's margin of victory in the prior election. We control linearly for the vote margin and its interaction with incumbency status. The parameter of interest, α_1, captures the discontinuity at a zero margin in the previous election and thus identifies incumbency advantage: the average electoral benefit of incumbency when party control is as-if randomly assigned in close races. In the baseline specification, we include election and district fixed effects (τ_t and δ_i) and show that the results are robust to excluding them.

To ensure consistent district definitions across consecutive elections, in our main specification, we exclude election years corresponding to redistricting cycles, as well as observations from states that underwent court-mandated redistricting since the prior election. We also restrict attention to races with both a Democratic and a Republican candidate and to districts where the Democratic party's margin of victory or defeat in election $t-1$ was less than 20 percentage points. This cutoff corresponds to the median value of the optimal bandwidth for the vote-share outcome variable, calculated using the procedure of Calonico et al. (2014) and Calonico et al. (2020) separately for each of the seven six-year periods (see Appendix Table A2). We also show that the results are robust to using alternative bandwidths, to adopting period-specific optimal bandwidths, and to removing bandwidth restrictions altogether.

To study how mobile broadband affected incumbency advantage, we estimate the following difference-in-discontinuities specification. We interact dummies for leads and lags of mobile broadband availability with the incumbency indicator $DemWon_{i,t-1}$, while also controlling for the direct effects of mobile broadband and incumbency:

$$\begin{aligned} DemVote_{i,t} = &\sum_{k\neq -1} \beta_1^k \, MobileBroadband_{i,t+k} \times DemWon_{i,t-1} \\ &+ \beta_2 \, DemWon_{i,t-1} + \sum_{k\neq -1} \beta_3^k \, MobileBroadband_{i,t+k} \\ &+ \beta_4 \, DemMargin_{i,t-1} + \beta_5 \, DemMargin_{i,t-1} \times DemWon_{i,t-1} + \tau_t + \delta_i + \varepsilon_{i,t}, \end{aligned} \tag{2}$$

where $MobileBroadband_{i,t+k}$ is an indicator for whether district i had at least some mobile broad-

[5] Because the U.S. two-party system implies that one party's vote share almost fully determines the other's, the choice of party is immaterial in this specification. Following Lee (2008), we focus on Democrats.

band coverage in period $t+k$.[6] The coefficients of interest are β_1^k, which estimate the effects of mobile broadband on incumbency advantage. Intuitively, the specification contrasts Democrats' electoral support in districts where Democrats barely won versus barely lost in the previous election, before and after mobile broadband became available, thereby identifying its effect on incumbency advantage.

Building on recent advances in staggered difference-in-differences designs (De Chaisemartin and D'Haultfœuille, 2020; Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2021; Borusyak et al., 2024; Gardner et al., 2024), our event-study analysis restricts the sample to elections that occurred before all congressional districts were treated, using the last-treated cohort as the control group. By 2012, all districts had at least some mobile broadband coverage, with the territorial expansion of mobile networks nearly complete. Hence, the identifying variation in our analysis comes from the first two congressional elections following its introduction, in 2008 and 2010. To estimate Equation (2), our baseline specification employs the Sun and Abraham (2021) estimator, which is designed for event-study settings with staggered adoption and dynamic treatment effects. The results are similar when we instead use alternative estimators, including Gardner et al. (2024) and conventional two-way fixed effects.

We next ask whether the overall decline in incumbency advantage was primarily driven by Democrats, Republicans, or both. To examine this heterogeneity, we adapt the framework of Lee (2008). Separately for Democratic and Republican incumbents, we estimate the average vote margin in election t conditional on narrowly winning election $t-1$, controlling for the vote margin in $t-1$. Specifically, for each period, we estimate the analogue of Equation (1), replacing the outcome variable with $DemMargin_{i,t}$. We then calculate party-specific incumbency advantage as $DemIncAdv_t = \alpha_0 + \tau_t + \alpha_1$ and $RepIncAdv_t = -\alpha_0 - \tau_t$.[7] Intuitively, in the presence of incumbency advantage, incumbents who narrowly won election $t-1$ should, on average, secure a larger margin in the subsequent election. This approach lets us trace the evolution of party-specific incumbency advantage while remaining closely tied to the canonical RDD of Lee (2008). Notably, the sum of $DemIncAdv_t$ and $RepIncAdv_t$ equals α_1, the RDD coefficient from Equation (1) estimated with the

[6] We primarily focus on mobile broadband availability measured by whether a district has any coverage. This definition yields the most precise estimates, though the results are robust to alternative measures of treatment status.

[7] As in other specifications, we exclude redistricting years and states that underwent court-mandated redistricting since the previous election. We further restrict to contested elections between Democratic and Republican candidates in districts where the winning margin in $t-1$ was within 20 percentage points. For ease of interpretation, we omit district fixed effects (which would otherwise replace α_0).

same outcome variable.[8] We also apply this approach to compare incumbency advantage for the sitting president's party and the opposition party at the time of each congressional election.

IV Results

IV.A Main results

Figure 1 illustrates the evolution of incumbency advantage between 1976 and 2024. Specifically, it presents regression discontinuity plots for the Democratic Party's vote share using raw data with no controls. The results show that incumbency advantage—measured by the discontinuity at the zero threshold—remained stable from the late 1970s through the mid-2000s, but began to decline thereafter. The decline was substantial: vote-share incumbency advantage fell from an average of approximately 11 percentage points in 1976–2004 to about 2 percentage points in 2020–2024.

The decline in incumbency advantage is highly robust. Appendix Figure A3 presents the same regression discontinuity plots using the residualized Democratic Party vote share after removing the effects of all the control variables; the results are very similar. Appendix Figure A4 similarly shows the evolution of incumbency advantage over time, based on estimating Equation (1), with and without district fixed effects. Appendix Table A3 reports the corresponding regression results and confirms that the estimates are not sensitive to the inclusion of controls or redistricting years.

To assess the role of mobile broadband in the decline of incumbency advantage, we estimate Equation (2) using three event-study estimators: Sun and Abraham (2021), Gardner et al. (2024), and conventional two-way fixed effects. The left panel of Figure 2 presents the corresponding estimates for vote-share incumbency advantage. Across all three specifications, the results are very similar. Immediately after the arrival of mobile broadband, incumbents lost approximately 6–8 percentage points in vote share. By contrast, in the pre-treatment periods, districts that were later exposed to mobile broadband followed trends similar to those in the control group.

Appendix Table A4 reports the regression output underlying the estimates presented in Figure 2, which are based on the most restrictive sample with a full set of controls. It also shows that the results are robust to excluding district fixed effects and to using an alternative specification that assumes a time-invariant effect of mobile broadband.

As mobile broadband coverage is measured at a finer spatial scale than congressional districts, we can test whether the decline in incumbency advantage was driven by local variation in broad-

[8] See Appendix A.II for additional details. The RDD coefficient for $DemMargin_{i,t}$ is twice that for $DemVote_{i,t}$.

band availability within each congressional race, while holding constant all race-specific factors, such as the identities of the candidates and the local political environment. We merge local mobile broadband availability with county-level electoral results from 1992 to 2024 and with survey-based voting data from the Cooperative Election Study (CES) (Ansolabehere and Schaffner, 2024) covering 2006 to 2024. We then estimate the effect of local broadband access on incumbent and challenger support, controlling for congressional district × election fixed effects.[9] Table 1 presents the results, confirming that incumbents lost significantly more electoral support in areas with greater mobile broadband access, even after accounting for the characteristics of specific electoral contests. The point estimates at the county- and ZIP-code-levels are roughly half the size of the corresponding estimates in Figure 2 and Table A4. This difference in magnitude may be explained by spillovers across local areas within the congressional districts. Voters commute and socialize across different parts of their districts, so mobile broadband in one area may influence voters who reside elsewhere.

Overall, in our baseline specification, the arrival of mobile broadband explains a decline in incumbency advantage that is comparable in magnitude to the total drop observed since the late 2000s. In the more demanding specification with district-year fixed effects, the implied effect falls to roughly one half of the observed decline, but remains substantial nonetheless.

IV.B Robustness, specification checks, and potential confounders for the main results

Probability of winning the election.—Throughout the paper, we measure incumbency advantage primarily in terms of vote share. The results are very similar when we instead consider the probability of winning the election. Figure A5 presents the corresponding estimates for the effect of mobile broadband on the probability that the Democratic candidate wins election t. The pattern closely mirrors the one in our main specification in Figure 2: there is no evidence of differential pre-trends, whereas the arrival of mobile broadband is followed by a sharp decline in incumbent electoral performance. The magnitudes are substantial. In particular, the introduction of mobile broadband reduces the incumbent's probability of winning by more than 30 percentage points relative to a pre-mobile-broadband mean of 55 percentage points.

Candidate-level incumbency advantage.—There is a debate in political science whether

[9]The regression specification is: $Incumbent/Challenger\ Result_{l,t} = MobileBroadband_{l,t} + \Phi_{i,t} + \varepsilon_{l,t}$, where l indexes subdistrict geographic units (i.e., counties or ZIP codes), whereas t indexes elections and i districts. $\Phi_{i,t}$ denotes district-election fixed effects.

incumbency advantage should be measured at the individual or the party level.[10] Because candidates' decisions to seek reelection may be endogenous, our main analysis focuses on party-level incumbency advantage. That said, our findings are highly robust to restricting the sample to congressional races in which the incumbent sought reelection. The right panels of Figures 2 and A5 replicate the analysis in Equation (2) for this subsample, while Appendix Tables A3 (Columns 5–8) and A5 present the corresponding regression estimates on the evolution of incumbency advantage and on the impact of mobile broadband. The results are very similar to those for the full sample.[11]

We also note that incumbent losses in primary elections are very rare, particularly before 2012. In our baseline regression sample, an incumbent who sought reelection lost the primary in only 8 of 1,295 elections (less than 1%), and none of these cases occurred in 2008–2010.

McCrary test.—Consistent with prior work on U.S. incumbency advantage, we find no evidence of selective sorting at the regression discontinuity threshold. This conclusion is based on the density test proposed by McCrary (2008), applied separately to each of the seven six-year periods between 1976 and 2024 (see Appendix Figure A6).

Bandwidth.—The choice of the optimal bandwidth, whether for the whole sample or by sub-periods, does not affect our results. As noted earlier, to ensure that our findings are not driven by different bandwidth choices across periods, our baseline regressions restrict the sample to observations where the incumbent party's margin of victory in election $t-1$ is less than 20 percentage points. This threshold corresponds to the median optimal bandwidth computed across the seven six-year periods using the procedure of Calonico et al. (2014) and Calonico et al. (2020), reported in Appendix Table A2.

Appendix Figures A7 and A8 replicate the analysis in Figure 1 and Appendix Figure A3, expanding the sample to elections in which the Democratic Party's margin of victory or defeat in the previous election was less than 60 percentage points. In practice, this restriction includes nearly all races in which both a Democratic and a Republican candidate competed.[12] The results

[10] Gelman and King (1990) highlight the personal, candidate-specific nature of incumbency advantage, whereas Lee (2008) demonstrates its persistence at the party level.

[11] As in other studies of candidate-level incumbency advantage in congressional elections, these estimates assume away the potential endogeneity in the incumbent's standing for re-election—either because of changes in expected chances to win or because of losing their party's primaries. Fowler and Hall (2014), for example, use state-level term limits as a source of exogenous variation in candidates' ability to stand for election. We cannot use this strategy because the U.S. Congress has no term limits.

[12] The results are very similar without any restriction on the previous election's margin of victory or defeat. However, because very few elections feature both a Democratic and a Republican candidate beyond the 60-percentage-point threshold, there are only a small number of observations outside this bandwidth.

indicate that the decline in incumbency advantage is not driven by the choice of bandwidth.

Similarly, Appendix Figures A9 and A10 show that the estimated effects of mobile broadband on incumbency advantage remain robust when the bandwidth restriction is removed and the full balanced set of U.S. congressional districts is included. As the bandwidth expands from 20 percentage points to 100 percentage points (i.e., no bandwidth restriction), the estimated treatment effect declines from slightly more than 6 percentage points to about 4 percentage points. This attenuation likely reflects the fact that challengers from the opposition party use mobile technologies to target more competitive races, where their chances of unseating the incumbent are greater.

Appendix Tables A11 and A12 further show that both the decline in incumbency advantage and the estimated effects of mobile broadband are robust to using the period-specific optimal bandwidths reported in Appendix Table A2.

Treatment threshold.—In our baseline specification, we classify a district as treated once any positive share of its population has access to mobile broadband. Figure A11 shows that the results are robust to alternative treatment definitions based on higher coverage thresholds—for example, when treatment is defined as 10%, 20%, 30%, 40%, or 50% of the district's population having access to mobile broadband. Across these alternative thresholds, the estimated effects remain quite similar.[13]

Treatment timing.—To provide further evidence that the decline of incumbency advantage in the United States was driven by the introduction of mobile broadband, we exploit variation in treatment timing across congressional districts. As shown in Appendix Figure A2, most districts received mobile broadband coverage in either 2008 or 2010. Therefore, we divide the sample into two groups—districts treated before the 2008 election and districts treated afterward—and examine the evolution of incumbency advantage separately for each of them. Appendix Figure A12 shows that the two groups exhibited similar levels of incumbency advantage through the mid-2000s. However, in the late 2000s, their trajectories temporarily diverged: incumbency advantage remained stable in districts that had not yet received mobile broadband coverage, but declined in districts that did. From the 2010s onward, once all districts had coverage, incumbency advantage fell similarly in both groups, further supporting the conclusion that mobile broadband played a central role in its decline.

The Great Recession.—A potentially important confounder in our analysis is the Great

[13]The positive, though statistically insignificant, coefficients at $t = -2$ for the 40% and 50% thresholds likely reflect the fact that some of these districts had already been effectively treated at lower levels of mobile broadband coverage before crossing the 40% or 50% threshold.

Recession, triggered by widespread defaults on subprime mortgages, which may have differentially affected incumbents' electoral performance in 2008–2010. To show that the decline in incumbency advantage was not driven by the recession, we compare the effects of mobile broadband across congressional districts differentially exposed to the Great Recession shock. We measure this shock in two ways: by the increase in the unemployment rate between 2007 and 2010, and by the decline in home values over the same period using Zillow data. Appendix Tables A8 and A9 show that the results are highly robust to controlling for these recession measures, as well as for their interactions with year fixed effects and with mobile broadband coverage. We also divide districts according to whether they experienced a below- or above-median increase in unemployment, or a below- or above-median decline in home values, and estimate the effects separately for each group. Appendix Table additionally A10 reports the event-study estimates for these subsamples. Across all specifications, mobile broadband has very similar effects on incumbent performance, providing no evidence that the Great Recession determined our results.

IV.C Heterogeneity by party

We next examine whether the expansion of mobile broadband had differential effects on Democratic and Republican incumbents. In aggregate, we find no evidence of such differences. To show this, we estimate party-specific incumbency advantage—as defined in Section III—for two periods: the twenty years before the arrival of mobile broadband (1988–2006) and the ten most recent years, after all districts had obtained full coverage (2016–2024). Panel A of Figure 3 presents the corresponding regression discontinuity plots for these two periods, illustrating how party-specific incumbency advantage is measured and how it relates to the baseline framework of Lee (2008). Panel B of Figure 3 then plots the resulting estimates and shows that the eventual decline in incumbency advantage was similar across parties: both Democrats and Republicans experienced declines in vote margins of 7–8 percentage points. The estimated difference in the magnitude of the decline between the two parties is close to zero and precisely estimated.

However, Panel A of Appendix Figure A13, which traces the evolution of party-level incumbency advantage from 1988 to 2024 by four-year presidential terms, shows that in the early mobile-broadband period, from 2008 to 2014, the two parties were not affected equally. Prior research shows that the digital age has contributed to the "nationalization" of political news (Fischer et al., 2020; Jaidka et al., 2023) and of political discourse in U.S. local elections (Jacobson, 2015), making congressional races increasingly responsive to national-level dynamics. Consistent with this broader

pattern, Guriev et al. (2021) show that the subnational expansion of mobile broadband reduced public confidence in national governments. If social media discourse enabled by mobile broadband primarily centers on national politics, then disillusionment with the national government should first weaken electoral support for congressional incumbents from the president's party, before widening into a more general erosion of support for incumbents from both major parties. Consistent with this hypothesis, we find that in the years immediately following the introduction of mobile broadband, incumbency advantage declined primarily for candidates from the president's party.

To illustrate this pattern, Panel B of Appendix Figure A13 plots the evolution of party-specific incumbency advantage by consecutive four-year presidential terms from 1988 to 2024, separately for incumbents from the president's party and for those from the opposition. Until 2016, the decline in incumbency advantage was concentrated among incumbents from the president's party.[14] In later years, incumbency advantage converged to zero for both parties.

To test whether the expansion of mobile broadband explains this pattern, we examine whether, in its early years (i.e., before 2012), it had differential effects on incumbency advantage for candidates from the president's party and from the opposition. Appendix Figure A14 presents the corresponding regression discontinuity plots for four election groups, defined by district-level mobile broadband availability and the party in control of the White House.

Panel A of Appendix Figure A14 shows the effect of mobile broadband when George W. Bush was president. During this period, Republican incumbency advantage sharply declined, while Democratic incumbency advantage remained essentially unchanged. Panel B shows the corresponding pattern during Barack Obama's first years in office: the arrival of mobile broadband reduced Democratic incumbency advantage, while Republican incumbency advantage was largely unaffected. Taken together, these results indicate that in its early years (before 2012), mobile broadband primarily reduced incumbency advantage for candidates from the president's party.

IV.D Channels: information and campaign finance

How did mobile broadband affect incumbents and challengers? To address this question, we first use the Cooperative Election Study (Ansolabehere and Schaffner, 2024), which asks respondents whether they disapprove of their congressional representative and whether they can describe the

[14] During the initial expansion of mobile broadband, in George W. Bush's second term, Republican congressional incumbents experienced a substantial decline in incumbency advantage, while Democrats maintained previous levels. By contrast, during Barack Obama's presidency, Democratic incumbents' advantage declined sharply, while Republicans' advantage rebounded.

ideology of both the incumbent and the challenger. For the ideology outcomes, we pool responses about incumbents and challengers and regress them on ZIP-code-level mobile broadband coverage, interacted with an indicator for whether the question refers to the incumbent or the challenger. We control for the previous election's vote margin interacted with the incumbent's party, year fixed effects, district-by-party fixed effects, and year-by-party fixed effects. As in the rest of the analysis, we focus on competitive elections within ±20 percentage points of the winning margin in districts that did not experience redistricting. Standard errors are clustered at the congressional district level.

Column 1 shows that mobile broadband increased disapproval of congressional incumbents, consistent with the findings of Guriev et al. (2021) for national governments worldwide. Because this question applies only to politicians in office, the data contain no corresponding measure of disapproval for challengers. We find that incumbents' disapproval increased by 2.6 percentage points when mobile broadband became available in a respondent's ZIP code, a 7% increase relative to the mean of 37%. Column 2 examines respondents' knowledge of incumbents' and challengers' policy positions. The estimated effects are positive and statistically significant for both, indicating that mobile broadband improved information about both types of candidates. The probability of being able to describe an incumbent's ideology increased by 2.0 percentage points relative to a mean of 0.55, while the probability of being able to describe a challenger's ideology increased by 3.2 percentage points relative to a mean of 0.39.

Second, we study the effect of mobile broadband on individual campaign contributions using data from the Database on Ideology, Money in Politics, and Elections (Bonica, 2024). Similar to Zytynski (2025), we consider both all individual contributions and small contributions of $500 or less. Using Poisson Pseudo-Maximum Likelihood (Correia et al., 2020) to account for the presence of zeros in the data (Chen and Roth, 2024), we estimate the effects of mobile broadband in the congressional district on the number and value of both types of contributions received by incumbents and challengers in each congressional race. Results are reported in Columns 3–6 of Table 2. The unit of observation is the congressional district, and all other aspects of the specification match those used in Columns 1 and 2.

The coefficients on mobile broadband coverage interacted with recipient type are positive for all outcomes, suggesting that both incumbents and challengers may have benefited, although the point estimates are substantially larger and more precisely estimated for challengers. None of the estimated effects is statistically significant for incumbents, whereas all are statistically significant

for challengers. The strongest effects appear for small contributions to challengers' campaigns: the number of such contributions increased by 77%, and their total value increased by 84% (Columns 5 and 6). Effects for incumbents are consistently smaller in magnitude, but they are imprecisely estimated. As a result, we cannot reject equality of effects between incumbents and challengers in any of these comparisons, except for the total amount of small contributions, for which challengers receive marginally statistically significantly more than incumbents. Overall, the evidence indicates that mobile broadband strengthened challengers by improving their fundraising capacity.

Taken together, these results suggest that the spread of mobile broadband reduced incumbents' popularity, improved voters' information about both incumbents and challengers, and strengthened challengers' fundraising capacity, thereby narrowing the informational and financial advantages historically enjoyed by incumbents.

V Conclusion

We demonstrate that party-level incumbency advantage in U.S. congressional elections has declined sharply since the late 2000s, a change largely driven by the introduction and rapid expansion of mobile broadband internet. Initially concentrated among incumbents from the president's party, the effects have since extended to both major parties, signaling a structural shift in American electoral politics. Mobile broadband increased disapproval of incumbents, presumably by delivering negative information about them to voters. It also improved voters' knowledge of challengers and enhanced challengers' ability to raise campaign funds, eroding the longstanding informational and financial advantages of incumbency.

These findings point to mobile broadband as a transformative technology in U.S. elections, one that disrupted entrenched patterns of political advantage. However, by increasing representatives' electoral vulnerability, it may also have increased their reliance on presidential support. More broadly, our results suggest that mobile broadband and social media platforms amplify voices critical of incumbents and the political status quo, reshaping the dynamics of democratic accountability.

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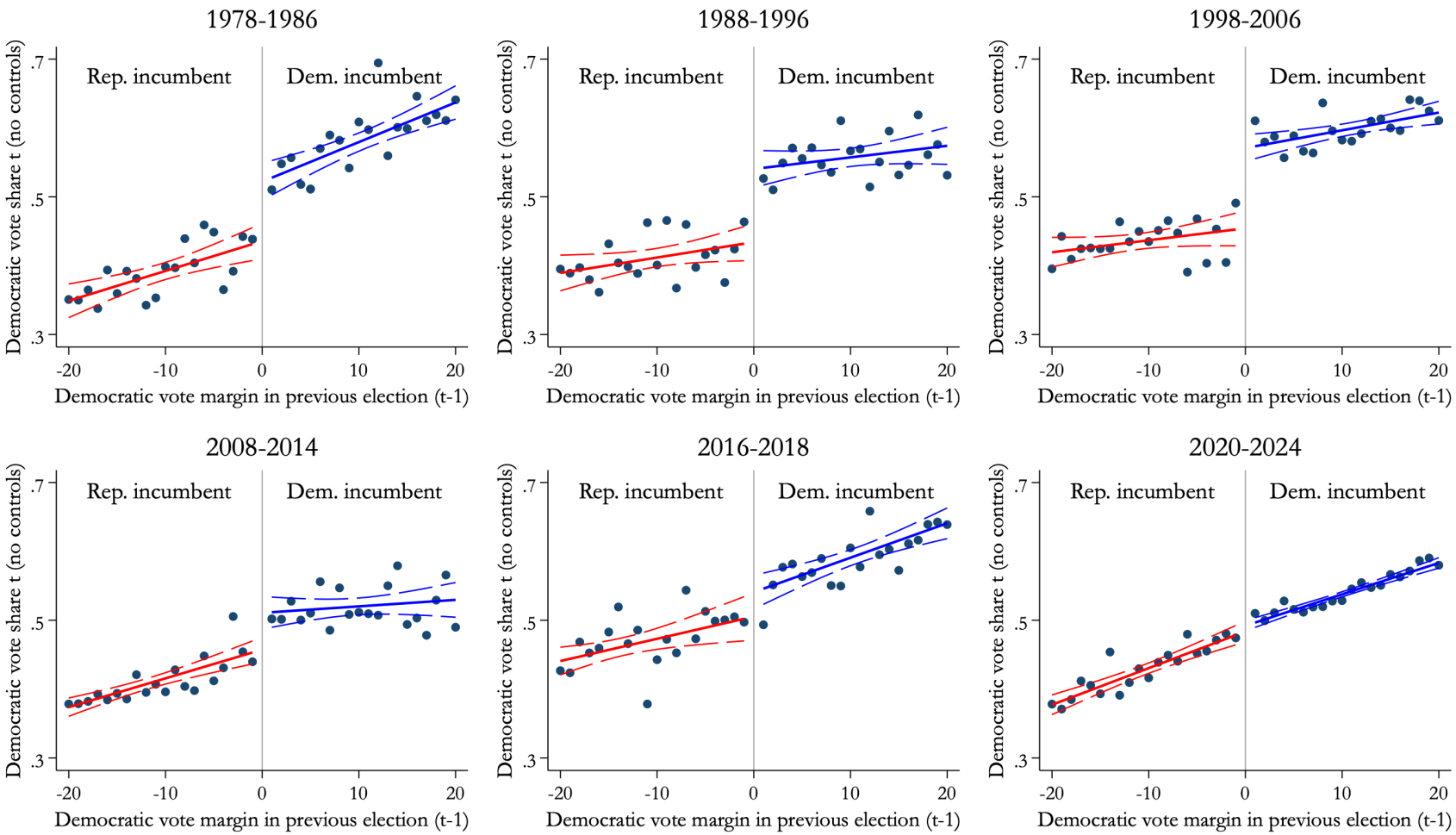


Figure 1: Regression Discontinuity Estimates of Incumbency Advantage, No Additional Controls

Note: The figure presents period-by-period regression discontinuity plots for vote share incumbency advantage with no controls included. The vertical axis represents the average residual of the Democratic vote share; the horizontal axis—the Democratic vote margin in the previous election. Each dot corresponds to the mean Democratic vote share, by one-percentage-point bins. The sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and time t.

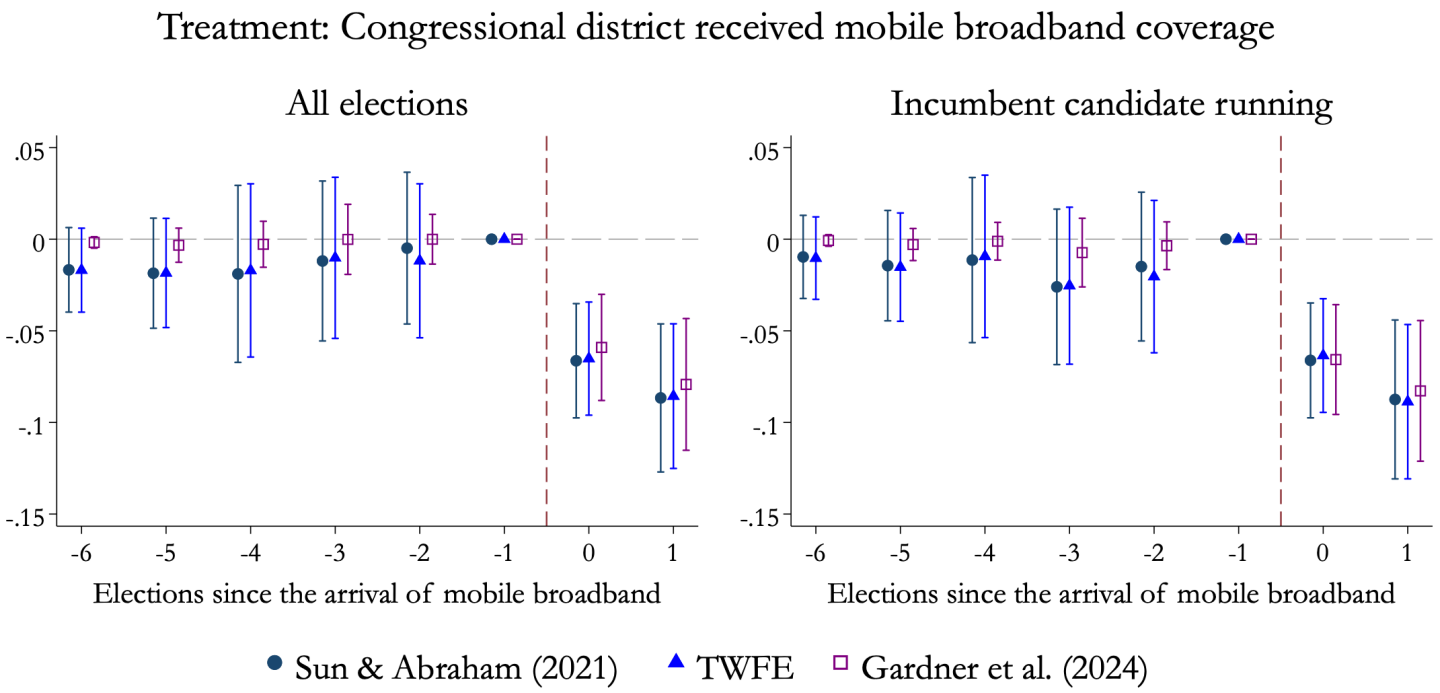


Figure 2: Mobile Broadband and Incumbency Advantage

Note: The figure presents the results of estimating Equation (2) for vote share incumbency advantage for all elections (left panel) and races where the sitting incumbent participated in the race (right panel) using the Sun and Abraham (2021) estimator, TWFE, and the Gardner et al. (2024) estimator. Corresponding regression estimates are presented in Column 5 of Appendix Table A4 (left panel) and Column 5 of Appendix Table A5 (right panel). The sample consists of elections prior to 2012 featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and time t. Controls include year and congressional district fixed effects, linear trends in the Democratic Party's vote margin in the congressional district in period $t-1$ (separately for races that Democrats won and lost), *Election win in period* $t-1$, and the lags and leads of the treatment variable. The standard errors are corrected for clusters at the level of the congressional districts.

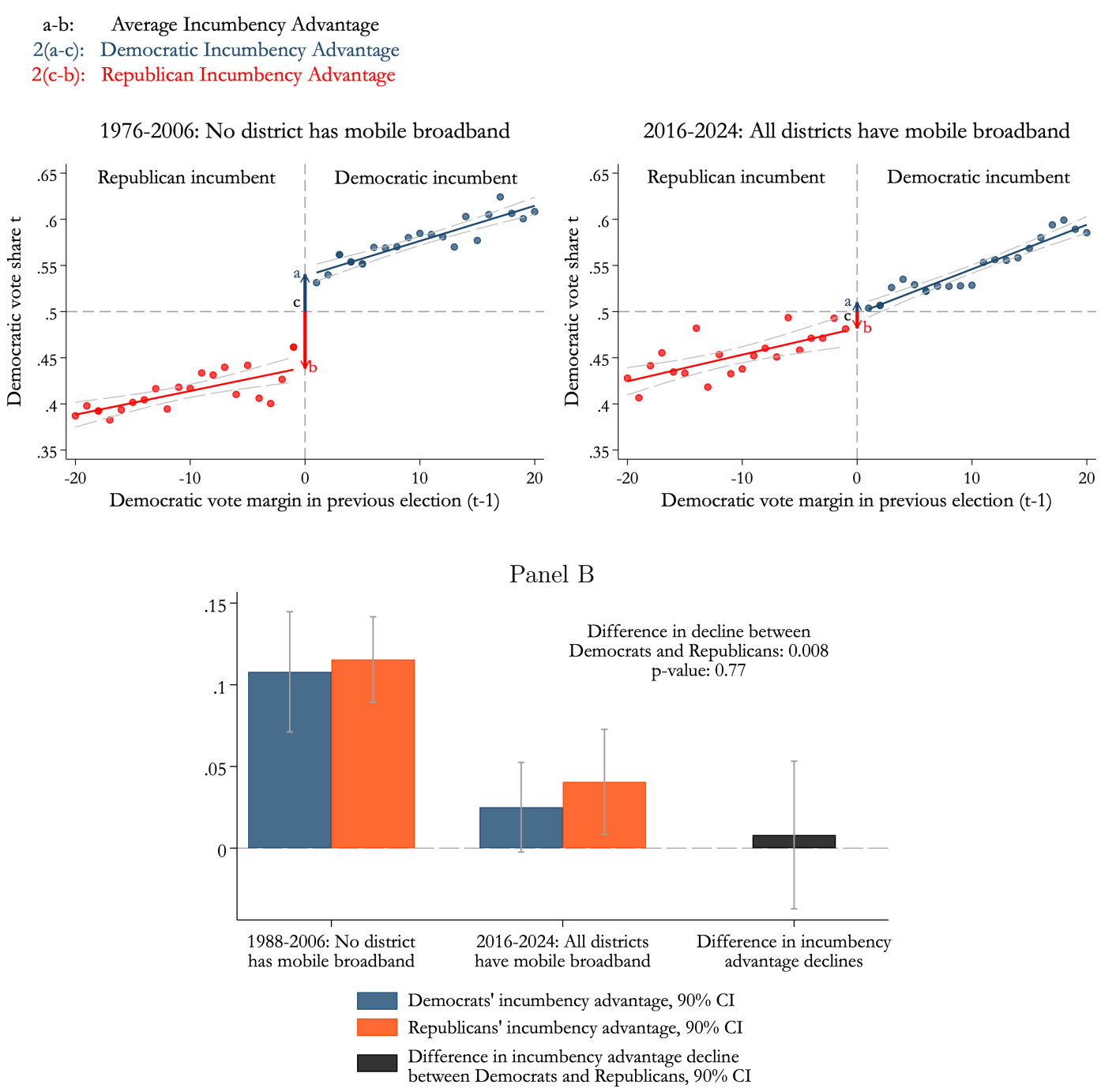


Figure 3: Incumbency Advantage by Party

Note: Panel A presents the regression discontinuity plots for the vote share incumbency advantage before any congressional district got access to mobile broadband (1976–2006) and after all districts got mobile broadband (2016–2024). Panel B reports the summary statistics for party-specific incumbency advantage over the same periods, along with the difference in the decline in incumbency advantage between the two parties. See Appendix A.II for details on the measurement of party-specific incumbency advantage, measured through a, b, and c. The sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in election $t-1$, and where the state did not experience redistricting between elections $t-1$ and t. The standard errors are corrected for clusters at the level of the congressional districts.

Table 1: Incumbent Party-Year and Congressional District-Year Fixed Effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dep. Var.:	Democratic candidate's vote share in election t		Incumbent's vote share, county level		Respondent votes for the incumbent		Challenger's vote share, county level		Respondent votes for the challenger	
Democrat won in $t-1$ × × District has MB	-0.049***	-0.051**								
	(0.014)	(0.026)								
County MB coverage			-0.027***	-0.034***			0.023***	0.033***		
			(0.008)	(0.008)			(0.008)	(0.008)		
ZIP code MB coverage					-0.023***	-0.021**			0.024***	0.023**
					(0.009)	(0.010)			(0.008)	(0.010)
Observations	741	741	45,716	44,645	323,673	323,673	45,716	44,645	323,673	323,673
Mean dep. var	0.488	0.488	0.627	0.627	0.611	0.611	0.352	0.352	0.382	0.382
Baseline FEs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Incumbent party-year FEs		✓								
District-year FEs				✓		✓		✓		✓

Note: MB = Mobile Broadband. This table reports estimates of the effect of mobile broadband on incumbent performance, controlling for incumbent party–year and congressional district–year fixed effects. In Columns 1 and 2, the unit of observation is a congressional district; in Columns 3, 4, 7, and 8—a county; and in Columns 5, 6, 9, and 10—an individual respondent. In Columns 1 and 2, the outcome is the Democratic candidate's vote share in district i at election t. In Columns 3, 4, 7, and 8, the outcome is the incumbent's (Columns 3–4) or challenger's (Columns 7–8) vote share in county j at election t. In Columns 5, 6, 9, and 10, the outcome is an indicator for whether the respondent voted for the incumbent (Columns 5–6) or the challenger (Columns 9–10) at election t. Baseline specifications include year and congressional district × incumbent party fixed effects (Columns 3–10) and all the controls in Equation 2, including congressional district and year fixed effects, in Columns 1 and 2. The specification in Column 2 additionally includes congressional district × incumbent-party fixed effects, and the specifications in Columns 4, 6, 8, and 10 additionally include congressional district–year fixed effects. In Columns 1 and 2, the sample consists of elections that took place between 1990 and 2012, featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$ in states that did not experience redistricting between elections at time $t-1$ and time t. In the remaining columns, the sample consists of elections featuring both a Democratic and a Republican candidate. Standard errors in parentheses are clustered at the congressional district level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2: Disapproval of Incumbents, Knowledge of Candidates' Ideology, and Campaign Contributions

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Disapproval of incumbents	Knowledge of candidate's ideology	Number of individual contributions	Amount of individual contributions	Number of indiv. contributions up to $500	Amount of indiv. contributions up to $500
Model:	OLS	OLS	PPML	PPML	PPML	PPML
Incumbent × ZIP code Mob. Broadband	0.026**	0.020**				
	(0.011)	(0.009)				
Challenger × ZIP code Mob. Broadband		0.032***				
		(0.011)				
Incumbent × District Mob. Broadband			0.214	0.184	0.180	0.111
			(0.316)	(0.201)	(0.338)	(0.223)
Challenger × District Mob. Broadband			0.566**	0.507**	0.572**	0.610**
			(0.264)	(0.249)	(0.281)	(0.242)
Observations	114,228	232,396	2,100	2,100	2,100	2,100
Incumbent: Mean dep. var	0.373	0.546	902.4	453,834	674.3	173,915
Challenger: Mean dep. var		0.388	637.9	303,986	492.7	122,989
P-value: $\gamma[Incumb.] = \gamma[Chal.]$		0.208	0.330	0.289	0.306	0.083
All controls	✓	✓	✓	✓	✓	✓

Note: The table presents the results of estimating the effects of mobile broadband on disapproval of incumbents, knowledge of the candidates' ideology, and campaign contributions. In Columns 1–2, the estimation model is a standard OLS specification. In Columns 3–6, the estimation model is Poisson Pseudo-Maximum Likelihood (PPML), following Correia et al. (2020). In Columns 1–2, the unit of observation is an individual. In Columns 3–6, the unit of observation is a congressional district. Controls include congressional district and year fixed effects, separately for races with Democratic and Republican incumbents and for outcomes related to the incumbent and the challenger, and year-specific linear trends in the Democratic Party's vote margin in congressional district i in period $t-1$, separately for races with Democratic and Republican incumbents and for outcomes related to the incumbent and the challenger. The sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and t. In Columns 1–2, the sample consists of elections from 2006 to 2024. In Columns 3–6, the sample consists of elections from 1978 to 2010. Standard errors in parentheses are corrected for clusters at the level of the congressional districts. *** p<0.01, ** p<0.05, * p<0.1.

Supplementary Appendix

A.I Data

Mobile broadband coverage.—Collins Bartholomew's coverage maps are based on data submitted to the GSM Association by mobile operators that use the GSM (Global System for Mobile Communications) standard. In the United States, the primary GSM providers during the study period were AT&T and T-Mobile, which accounted for up to 40% and 16% of wireless subscriptions, respectively, between 2008 and 2019 (Statista, 2023). Both companies submitted coverage data to the GSM Association. AT&T played a particularly significant role in the early years of mobile broadband due to its exclusivity agreement with Apple, which made it the sole U.S. provider of iPhone service from the device's launch in 2007 until 2011. Because the iPhone was central in transforming how individuals accessed and used mobile internet, and given that our identifying variation is based on the 2008 and 2010 congressional elections, the availability of AT&T coverage is especially important for our analysis.[15]

The Mobile Coverage Explorer dataset does not include two major U.S. mobile operators, Verizon and Sprint, that used the CDMA communication standard during this period. At the time, CDMA-compatible phones were designed in a way that user identification (e.g., phone number) with the carrier was conducted through the phone's hardware. As a result, CDMA users were tied to the device that they initially purchased because the carrier signal cannot be separated from the device. Due to this feature, Verizon and Sprint users were much less affected by the initial phases of the "smartphone revolution" kicked off by the introduction of the iPhone in 2007: early CDMA-compatible devices (HTC, Blackberry, Motorola Droid, and other early Android devices) were much less suitable for social media use, internet browsing, and sharing images and videos than the iPhone. Both Verizon and Sprint eventually became compatible with modern smartphones, but this happened much later. For instance, the first CDMA-compatible iPhone was introduced only in 2011, after the period when all of the U.S. congressional districts had at least some areas covered with GSM 3G. In earlier years, however, AT&T's exclusivity agreement with Apple makes it plausible that GSM networks played a particularly important role in increasing smartphone adoption and transforming internet use.[16]

[15] No congressional district had access to mobile broadband in 2006, whereas virtually all congressional districts did by 2012 (see Figure A2).

[16] Coverage data for Verizon and Sprint are available through the Federal Communications Commission (FCC), beginning in late 2010 (reflecting treatment status in 2011), when all the congressional districts already had access

Campaign Contributions.—In the Database on Ideology, Money in Politics, and Elections (DIME) (Bonica, 2024), we restrict attention to contributions not exceeding the maximum legally permitted individual limits and calculate, for each candidate, both the number of contributions received and their total value.[17] In addition, we separately compute the number and total value of small contributions, defined as those not exceeding $150.

Unemployment.—To examine heterogeneity in the effects of mobile broadband across the congressional districts, we classify districts according to whether they experienced above- or below-median increases in the unemployment rate between 2007 and 2010. We use county-level labor market data from the U.S. Bureau of Labor Statistics, matching counties to congressional districts based on their centroids. For each district, we then calculate the unemployment rate in 2007 and in 2010, and divide districts into two groups depending on whether the increase was above or below the median of 4.62 percentage points.

Housing prices.—We also examine the heterogeneity in the effects of mobile broadband across the congressional districts that were differentially affected by the collapse of the U.S. housing bubble in 2008. We use data from Zillow's Home Value Index (ZHVI) to calculate changes in typical home values between 2007 and 2010 across congressional districts. The ZHVI is a seasonally adjusted measure reflecting the typical home value in a given area, calculated from the values of homes in the 35th to 65th percentile of the local housing market. The index is constructed as a weighted average of model-based home value estimates for more than 100 million U.S. residential properties, regardless of recent sales activity.

For each congressional district, we calculate the change in ZHVI between 2007—the year preceding the collapse of the U.S. housing market—and 2010, when housing prices in the United States reached a local minimum. We then divide the sample into two groups: districts that experienced a decline in average home values greater than $30,800—the median decline across all districts—and those with smaller decreases.

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to mobile broadband. In a related study, Melnikov (2025) utilizes both the Mobile Coverage Explorer and FCC data at the ZIP-code level—many of which remained untreated in 2011—to compare the post-2010 effects of the two types of mobile operators on political polarization in the United States. The estimates derived from the two data sources are highly consistent. Thus, although the absence of post-2010 variation in the congressional districts' treatment status prevents us from conducting a comparable analysis, there is no evidence to suggest that GSM and CDMA operators differentially affected voters after 2010.

[17]The maximum permitted individual contribution limits were as follows: $1,000 before 2004, $2,000 in 2004, $2,100 in 2006, $2,300 in 2008, and $2,400 in 2010.

A.II Party-specific incumbency advantage

The canonical regression discontinuity design framework developed by Lee (2008) does not allow for calculating a party-specific measure of incumbency advantage in a two-party system. To illustrate this point, consider the following notation. Let V_p^{0+} and V_p^{0-} denote the expected vote shares of the congressional candidate from party $p \in \{d, r\}$ in election t, conditional on the party narrowly winning or losing the election in the previous period, respectively. Lee's canonical regression discontinuity estimator calculates incumbency advantage using the Democratic Party's vote share as follows:

$$IA_d^L = V_d^{0+} - V_d^{0-}.$$

In a two-party system, where $V_d^{0+} = 1 - V_r^{0-}$ and $V_d^{0-} = 1 - V_r^{0+}$, an analogous regression discontinuity measure using the Republican party's vote share yields an identical result:

$$IA_r^L = V_r^{0+} - V_r^{0-} = [1 - V_d^{0-}] - [1 - V_d^{0+}] = V_d^{0+} - V_d^{0-} = IA_d^L.$$

To address this limitation, we propose the following simple party-specific measure of incumbency advantage:

$$\widetilde{IA}_p = V_p^{0+} - V_{p'}^{0-} = 2V_p^{0+} - 1$$

where p' represents the party other than p. In other words, this measure of incumbency advantage represents the expected vote margin of party p conditional on it narrowly winning the previous election. In the absence of incumbency advantage, a congressional candidate who narrowly won election $t-1$ (by margin $\varepsilon \to 0$) would be expected to receive a vote margin of 0 in election t. Therefore, $\widetilde{IA}_i$ captures the average electoral advantage incumbent candidates from party p enjoy in subsequent elections.

The advantage of $\widetilde{IA}_p$ is that, in a two-party system, its sum across the two parties corresponds to incumbency advantage measured for the same outcome variable (i.e., vote margin) using the regression discontinuity design of Lee (2008):

$$\widetilde{IA}_d + \widetilde{IA}_r = 2V_d^{0+} - 1 + 2V_r^{0+} - 1 = 2V_d^{0+} - 2V_d^{0-} = 2IA_d^L = 2IA_r^L.$$

The relation of $\widetilde{IA}_p$ to the RDD-based vote *share* incumbency advantage is also straightforward: $IA_p^L = (\widetilde{IA}_d + \widetilde{IA}_r)/2$.

Our party-specific measure of incumbency advantage has an intuitive graphical representation. Panel A of Figure 3 presents pooled regression discontinuity plots for 1976-2006 (left

panel) and 2016-2004 (right panel). In each of these graphs, we mark V_d^{0+} and V_d^{0-} as a and b, respectively. We also mark the 50% point as c. Following our analysis, Democratic incumbency advantage is $2V_d^{0+} - 1 = 2(a - c)$, Republican incumbency advantage is $2V_r^{0+} - 1 = 2(1 - V_d^{0-}) - 1 = 2(c - b)$, and the average incumbency advantage is $V_d^{0+} - V_d^{0-} = a - b$. It is intuitive: Democratic incumbency advantage is the distance between the vote share of the Democratic incumbent narrowly winning the election and 50% (the latter being the expected outcome in the absence of incumbency advantage). Similarly, Republican incumbency advantage is the distance between the vote share of the Republic incumbent narrowly winning the election (the area immediately to the left of zero) and 50%.

The raw data presented in Panel A of Figure 3 show that before the arrival of mobile broadband (1976-2006) each party had a substantial incumbency advantage (with Republican one being larger). After the rollout of mobile broadband (2016-2014), incumbency advantage of each party virtually disappeared.

Appendix Figures

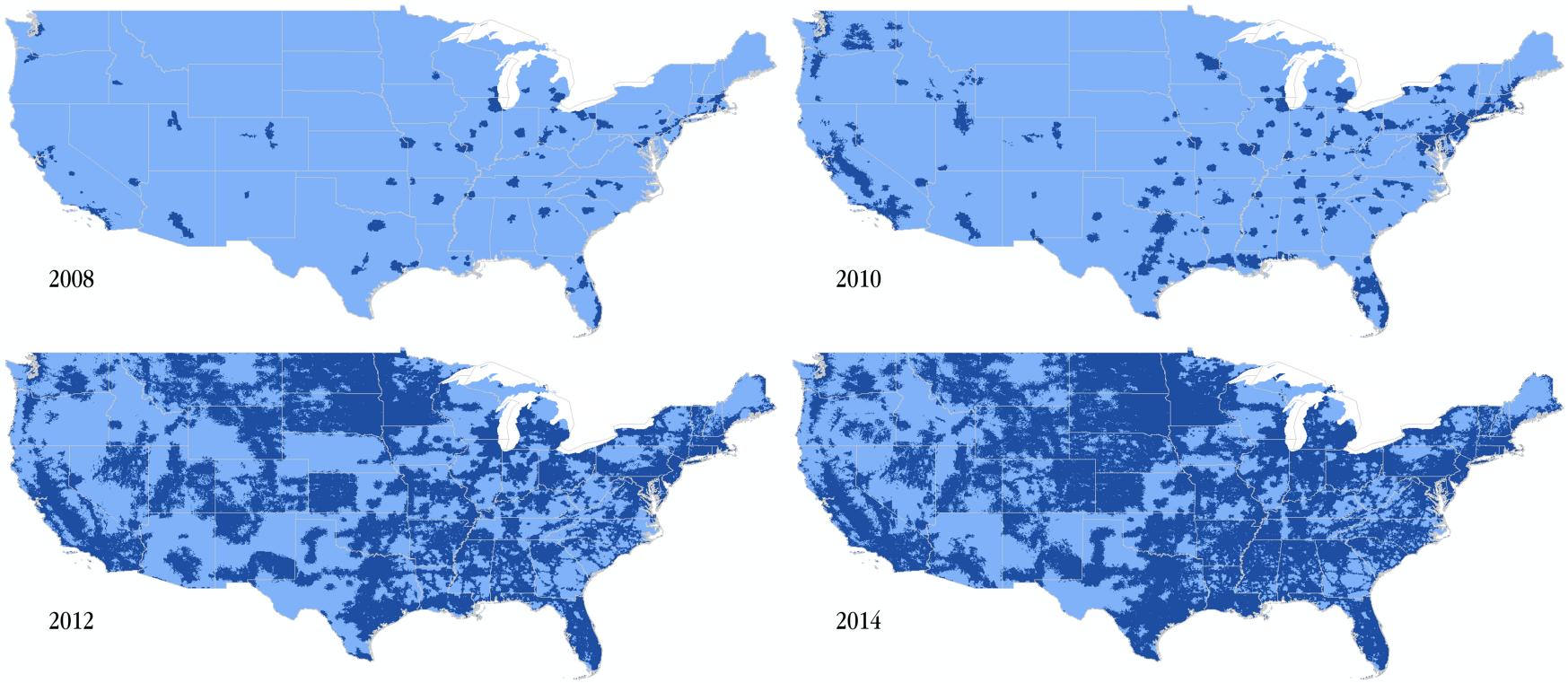


Figure A1: Expansion of Mobile Broadband Between 2008 and 2014

Note: The maps depict mobile broadband network coverage in the contiguous United States for two-year periods between 2008 and 2014. All the maps present mobile broadband network coverage at the beginning of that year. The data consist of 1×1-kilometer binary grid cells.

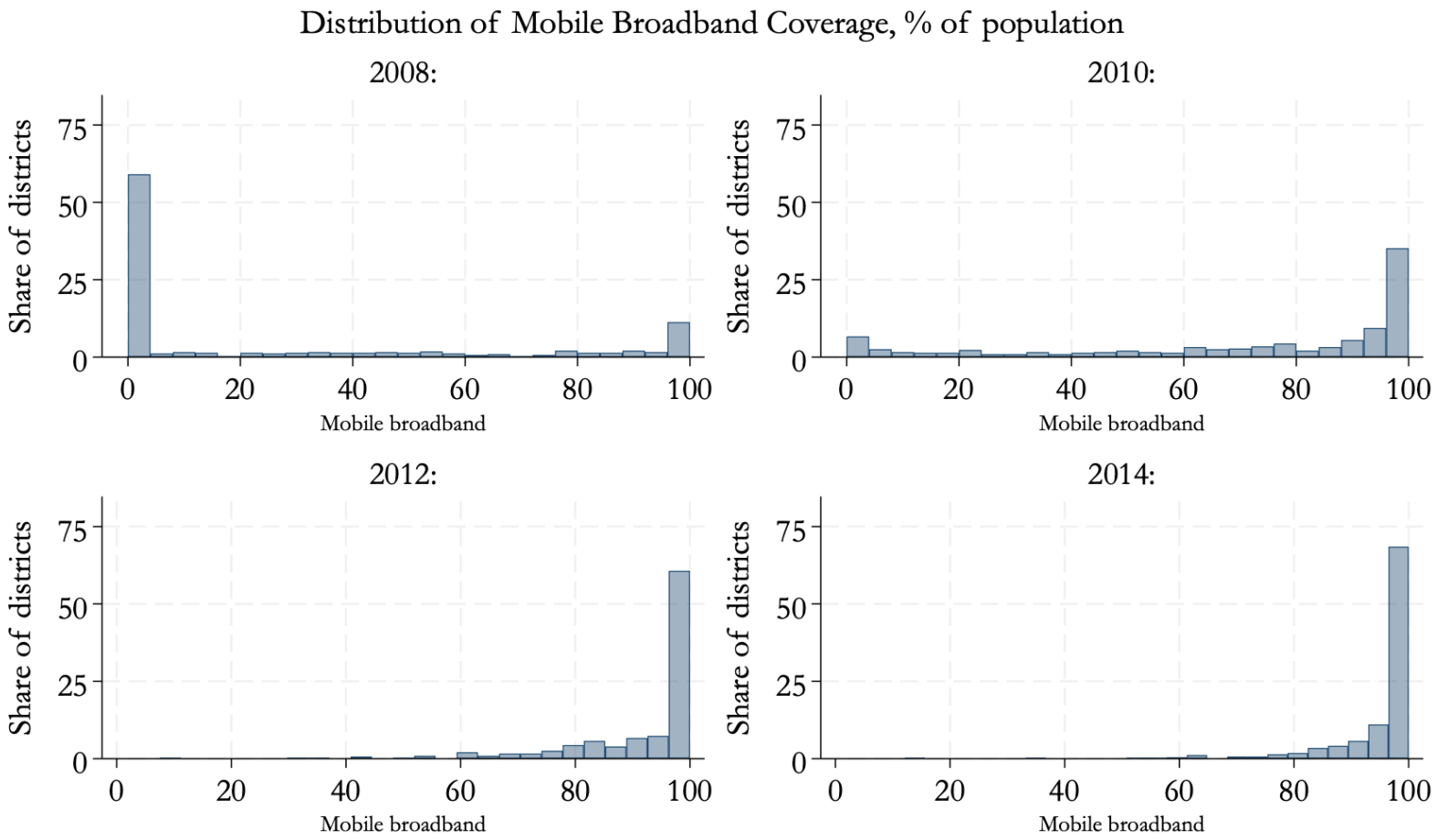


Figure A2: Distribution of Mobile Broadband Coverage, % of population

Note: The figure depicts the distribution of the share of the congressional districts' population with access to mobile broadband between 2008 and 2014. All histograms present coverage at the beginning of that year.

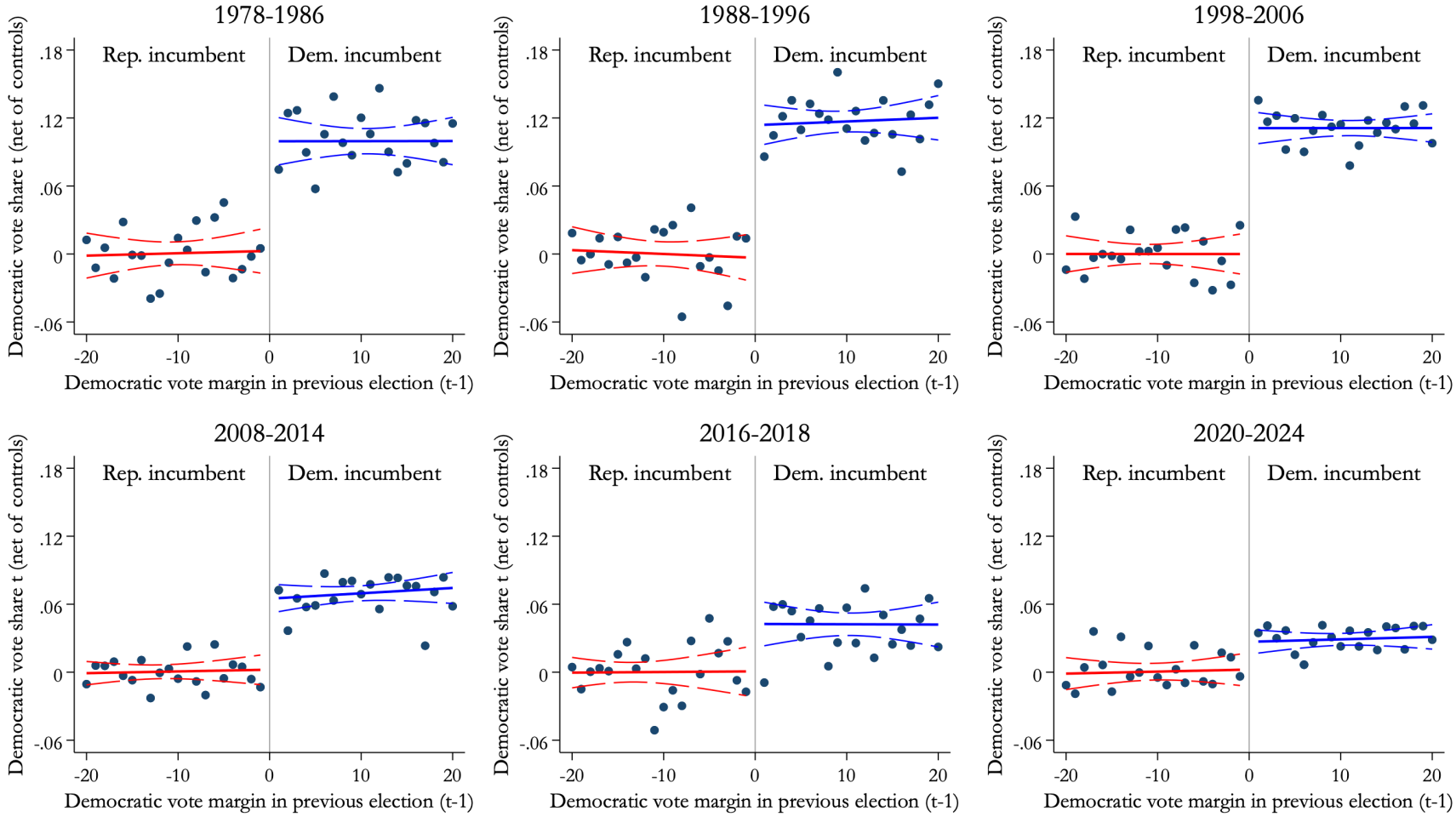


Figure A3: Regression Discontinuity Estimates of Incumbency Advantage, Net of All Controls

Note: The figure presents period-by-period regression discontinuity plots for vote share incumbency advantage, net of all controls. Controls include year and congressional district fixed effects and linear trends in the Democratic Party's vote margin in the congressional district in period $t-1$, separately for races that Democrats won and lost and for each period. The vertical axis represents the average residual of the Democratic vote share; the horizontal axis—the Democratic vote margin in the previous election. The sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and time t.

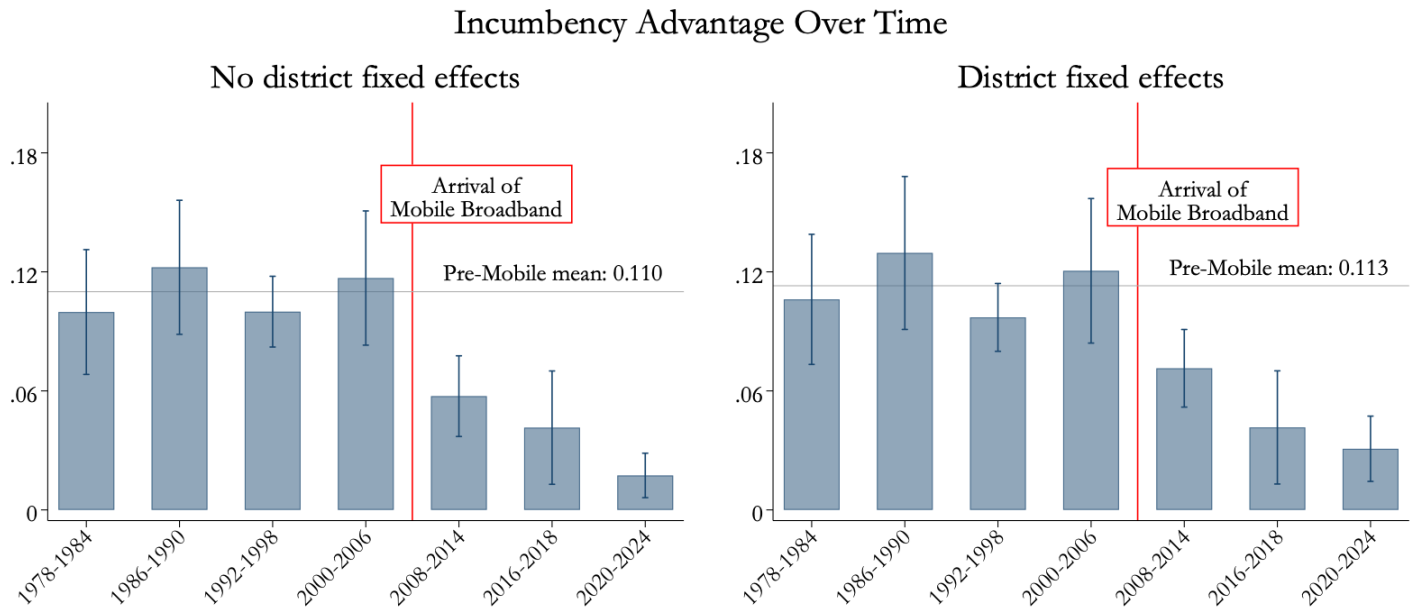


Figure A4: Decline in Incumbency Advantage Over Time

Note: The figure presents the results of estimating Equation (1) for different time periods, with (right panel) and without (left panel) controlling for congressional district fixed effects. Corresponding regression estimates are presented in Columns 2 and 4 of Appendix Table A3. The sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and time t. Other controls include year fixed effects and linear trends in the Democratic Party's vote margin in the congressional district in period $t-1$, separately for races that Democrats won and lost and for each time period. The standard errors are corrected for clusters at the level of the congressional districts.

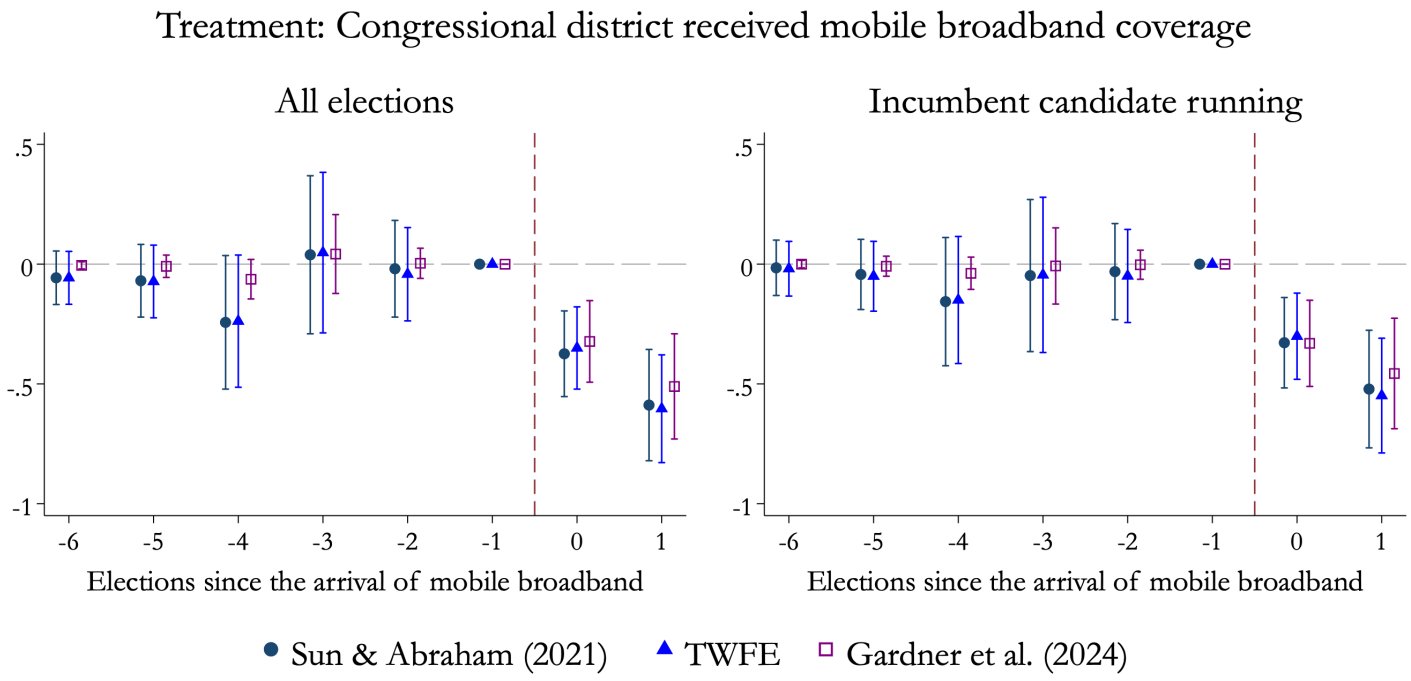


Figure A5: Mobile Broadband and the Incumbent's Probability of Winning the Election

Note: The figure presents the results of estimating Equation (2) for the outcome of winning the election for all elections (left panel) and races where the sitting incumbent participated in the race (right panel) using the Sun and Abraham (2021) estimator, TWFE, and the Gardner et al. (2024) estimator. Corresponding regression estimates are presented in Column 5 of Appendix Table A6 (left panel) and Column 5 of Appendix Table A7 (right panel). The sample consists of elections prior to 2012 featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and time t. Controls include year and congressional district fixed effects, linear trends in the Democratic Party's vote margin in the congressional district in period $t-1$ (separately for races that Democrats won and lost), *Election win in period* $t-1$, and the lags and leads of the treatment variable. The standard errors are corrected for clusters at the level of the congressional districts.

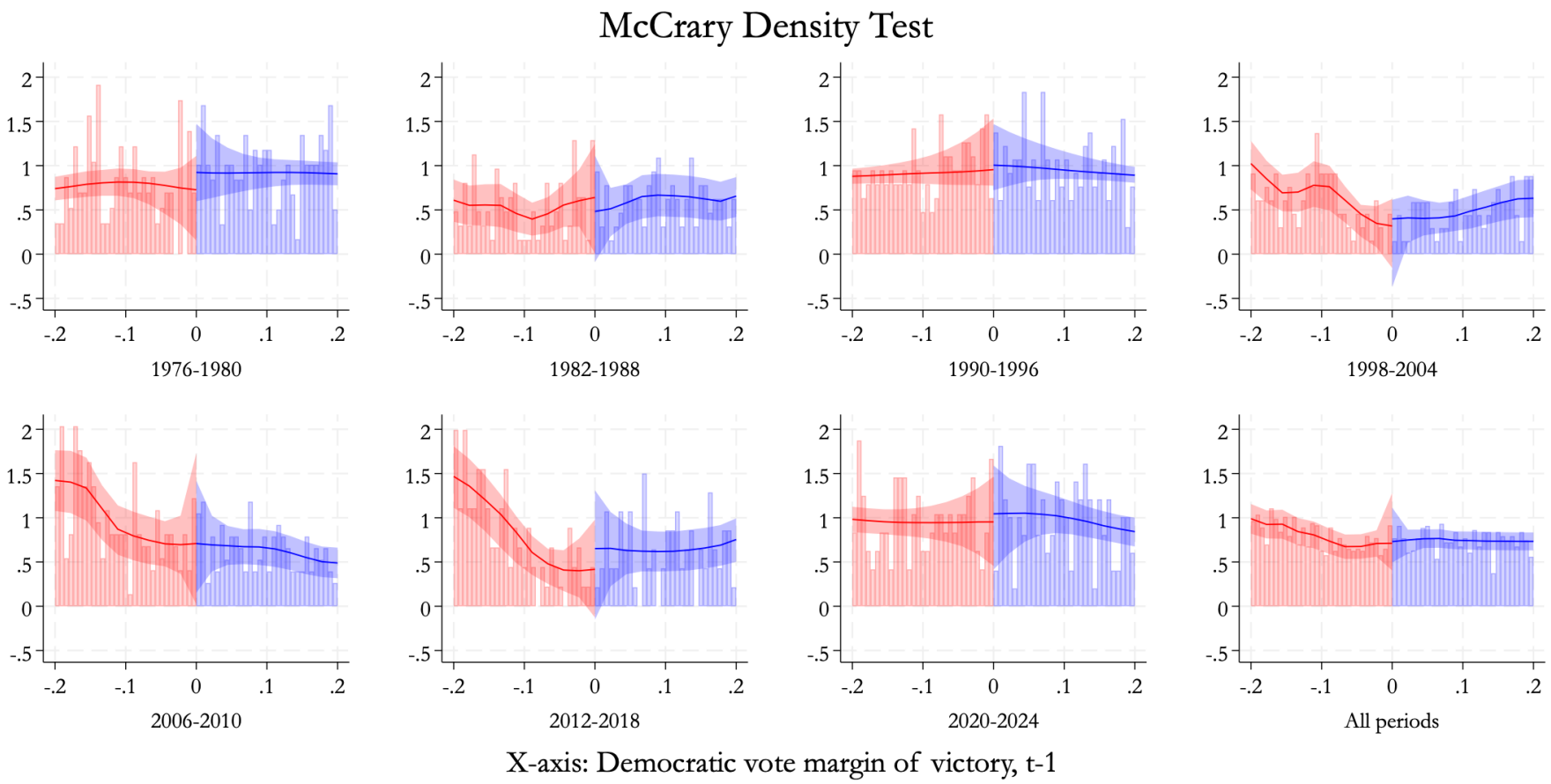


Figure A6: McCrary Density Test

Note: The figure presents the period-by-period results of the McCrary (2008) density test for the RD running variable: the Democratic vote margin in $t-1$. For each period, the sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and time t.

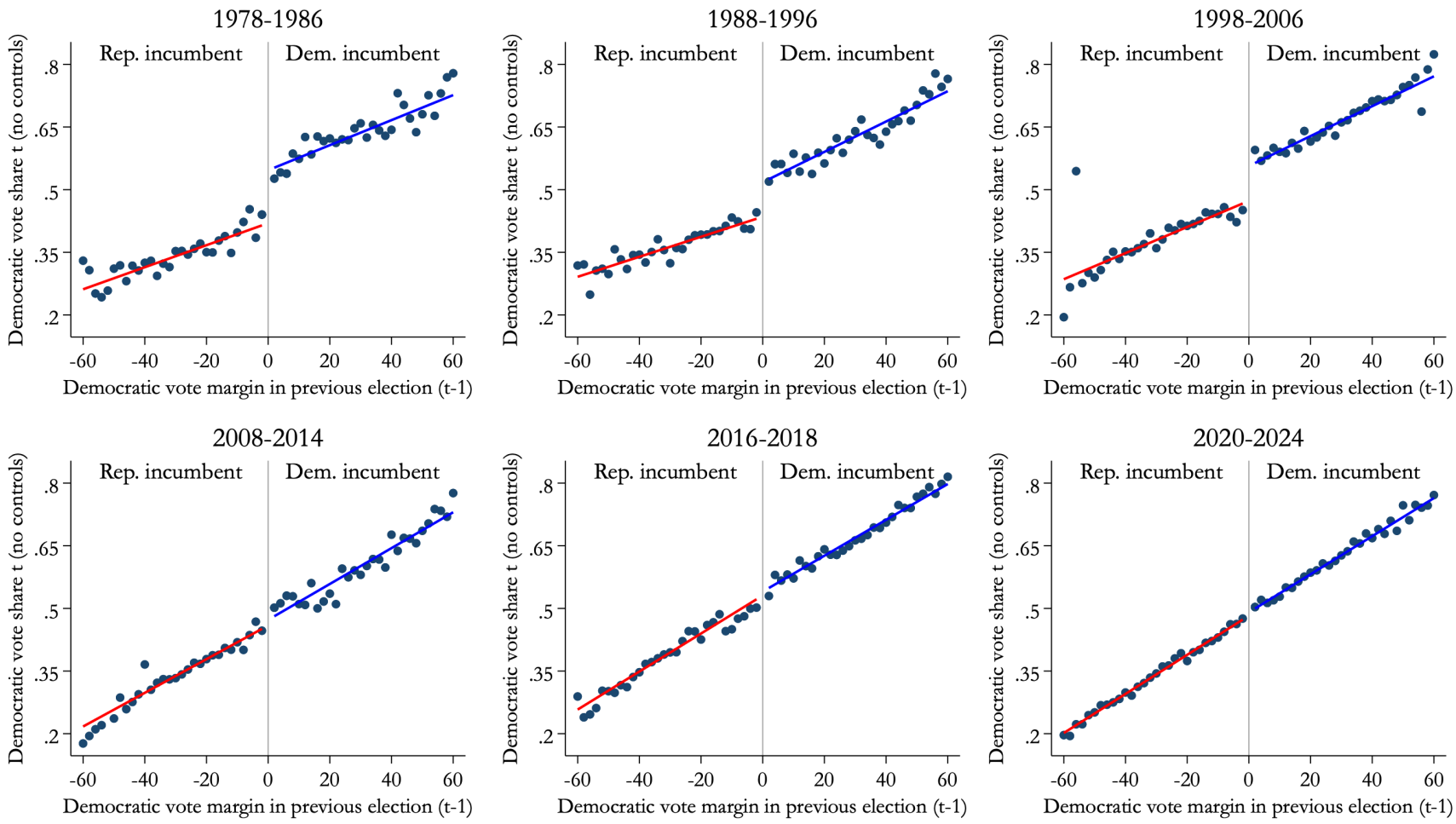


Figure A7: Regression discontinuity estimates of incumbency advantage without controls (60-percentage-point bandwidth)

Note: The figure presents period-by-period regression discontinuity plots for vote share incumbency advantage with no controls included. The vertical axis represents the average residual of the Democratic vote share; the horizontal axis—the Democratic vote margin in the previous election. Each dot corresponds to the mean Democratic vote share, by one-percentage-point bins. The sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 60 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and time t.

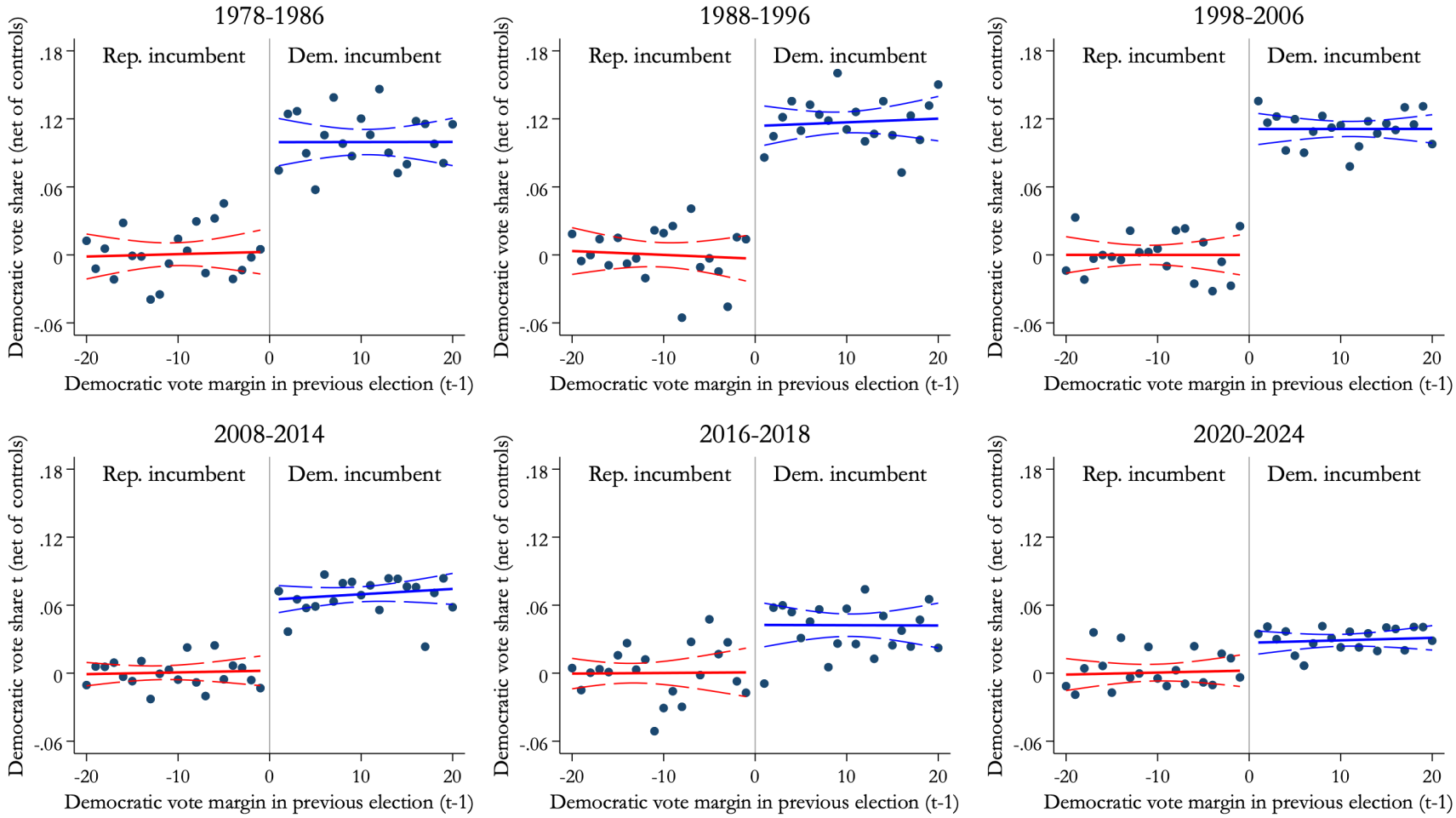


Figure A8: Regression discontinuity estimates of incumbency advantage net of all controls (60-percentage-point bandwidth)

Note: The figure presents period-by-period regression discontinuity plots for vote share incumbency advantage, net of all controls. Controls include year and congressional district fixed effects and linear trends in the Democratic Party's vote margin in the congressional district in period $t-1$, separately for races that Democrats won and lost and for each period. The vertical axis represents the average residual of the Democratic vote share; the horizontal axis—the Democratic vote margin in the previous election. The sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 60 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and time t.

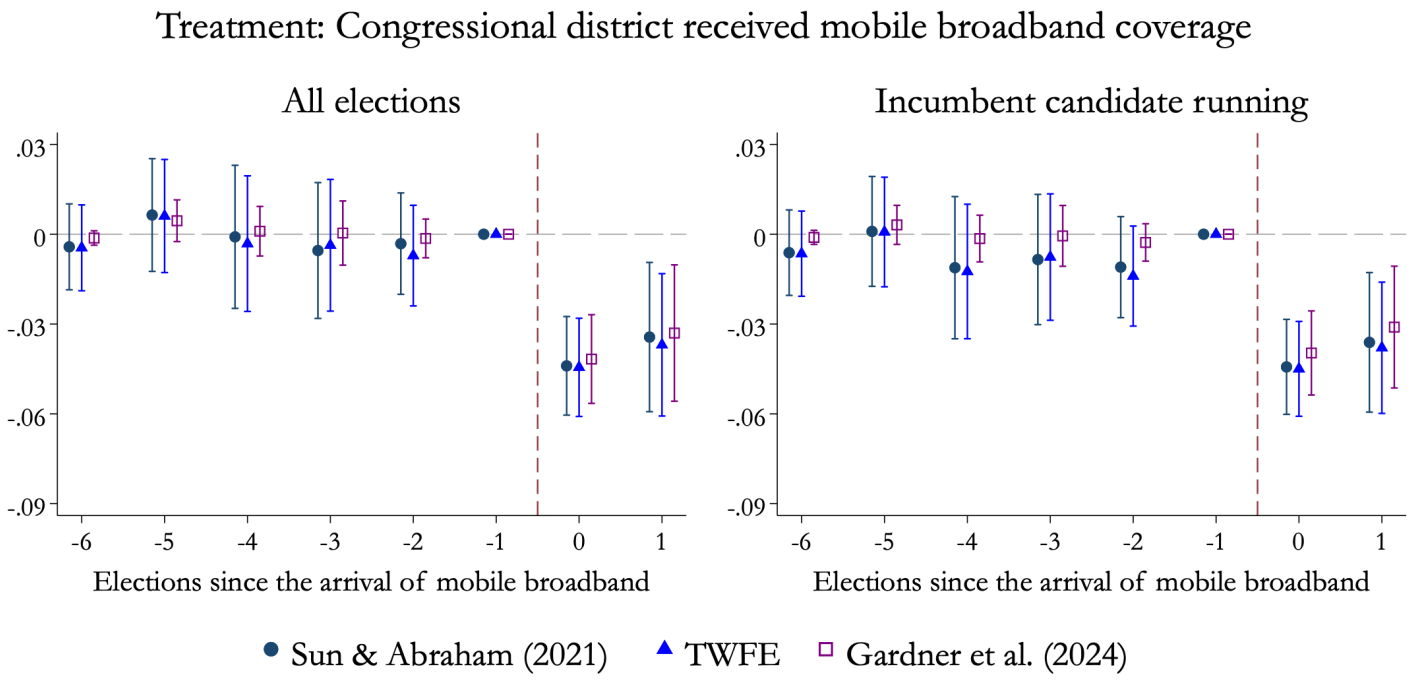


Figure A9: Mobile Broadband and Incumbency Advantage, No Bandwidth Restrictions

Note: The figure presents the results of estimating Equation (2) for vote share incumbency advantage for all elections (left) and races where the sitting incumbent participated in the race (right) using the Sun and Abraham (2021) estimator, TWFE, and the Gardner et al. (2024) estimator, without restrictions on the Democratic Party's margin of victory or defeat in the previous election. The sample consists of elections prior to 2012 featuring both a Democratic and a Republican candidate in districts where the state did not experience redistricting between elections at time $t-1$ and time t. Controls include year and congressional district fixed effects, linear trends in the Democratic Party's vote margin in the congressional district in period $t-1$ (separately for races that Democrats won and lost), *Election win in period* $t-1$, and the lags and leads of the treatment variable. The standard errors are corrected for clusters at the level of the congressional districts.

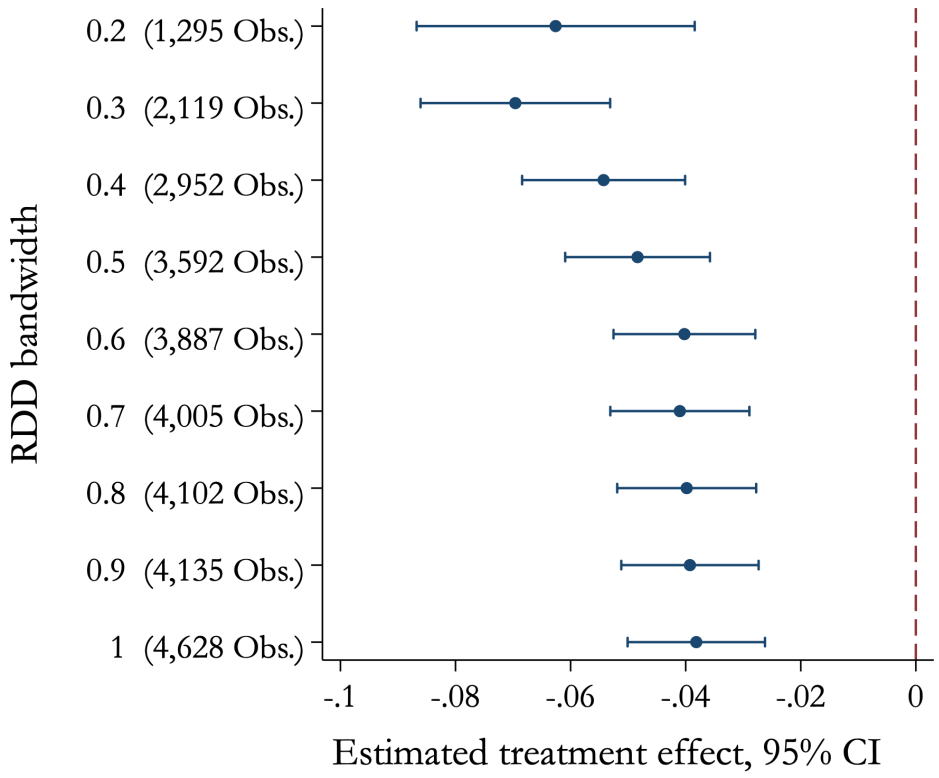


Figure A10: Effect of Mobile Broadband on Incumbency Advantage, by Bandwidth

Note: The figure illustrates how the estimated average treatment effect of mobile broadband on vote-share incumbency advantage varies as one relaxes restrictions on the Democratic Party's margin of victory or defeat in the previous election. The y-axis reports the maximum allowed Democratic Party margin of victory or defeat in the previous election; the x-axis—the corresponding estimated average treatment effect together with its 95% confidence interval. In all regressions, the sample consists of elections prior to 2012 featuring both a Democratic and a Republican candidate in districts where the state did not experience redistricting between elections at time $t-1$ and time t. Controls include year and congressional district fixed effects, linear trends in the Democratic Party's vote margin in the congressional district in period $t-1$ (separately for races that Democrats won and lost), *Election win in period* $t-1$, and mobile broadband coverage. Standard errors are clustered at the congressional district level.

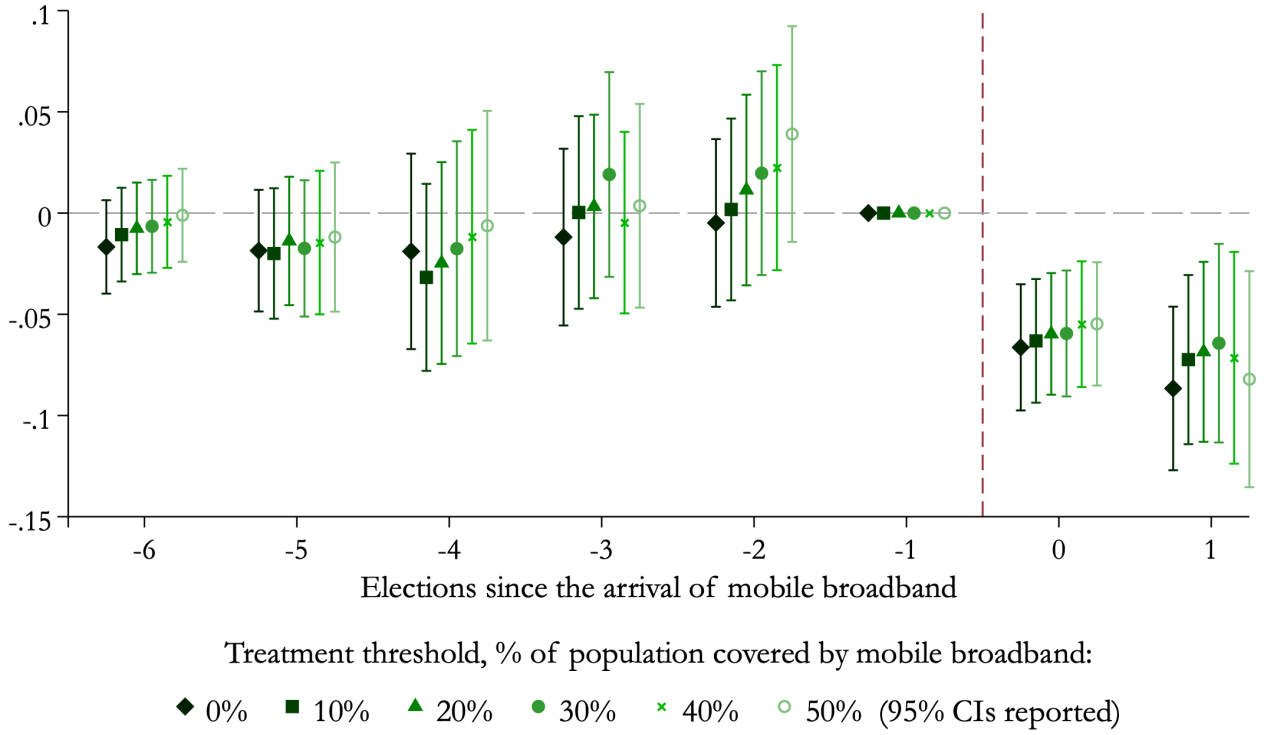


Figure A11: Robustness to Alternative Treatment Thresholds

Note: The figure reports estimates of Equation (2) for vote-share incumbency advantage, using the Sun and Abraham (2021) estimator, as a function of the treatment threshold. Specifically, it shows how the estimated treatment effects vary when a congressional district is classified as treated only once x% of the district's population has access to mobile broadband. The sample consists of elections prior to 2012 featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and time t. Controls include year and congressional district fixed effects, linear trends in the Democratic Party's vote margin in the congressional district in period $t-1$ (separately for races that Democrats won and lost), *Election win in period* $t-1$, and the lags and leads of the treatment variable. The standard errors are corrected for clusters at the level of the congressional districts.

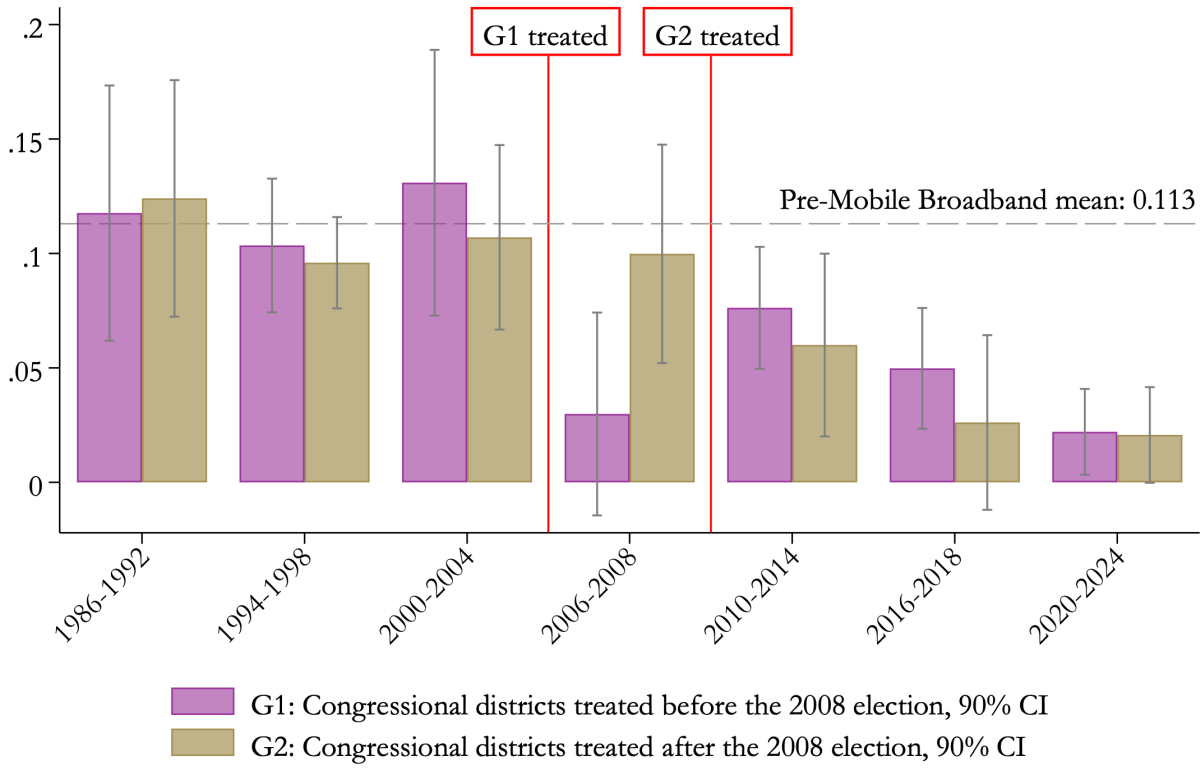


Figure A12: Incumbency Advantage Over Time, by Treatment Cohort

Note: The figure presents the results of estimating Equation (1), separately for the cohort of congressional districts treated before and after the 2008 elections. Controls include year and congressional district fixed effects and linear trends in the Democratic Party's vote margin in the congressional district in period $t-1$, separately for races that Democrats won and lost, each year, and each treatment cohort (i.e., G1 and G2). The sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and time t. The standard errors are corrected for clusters at the level of the congressional districts.

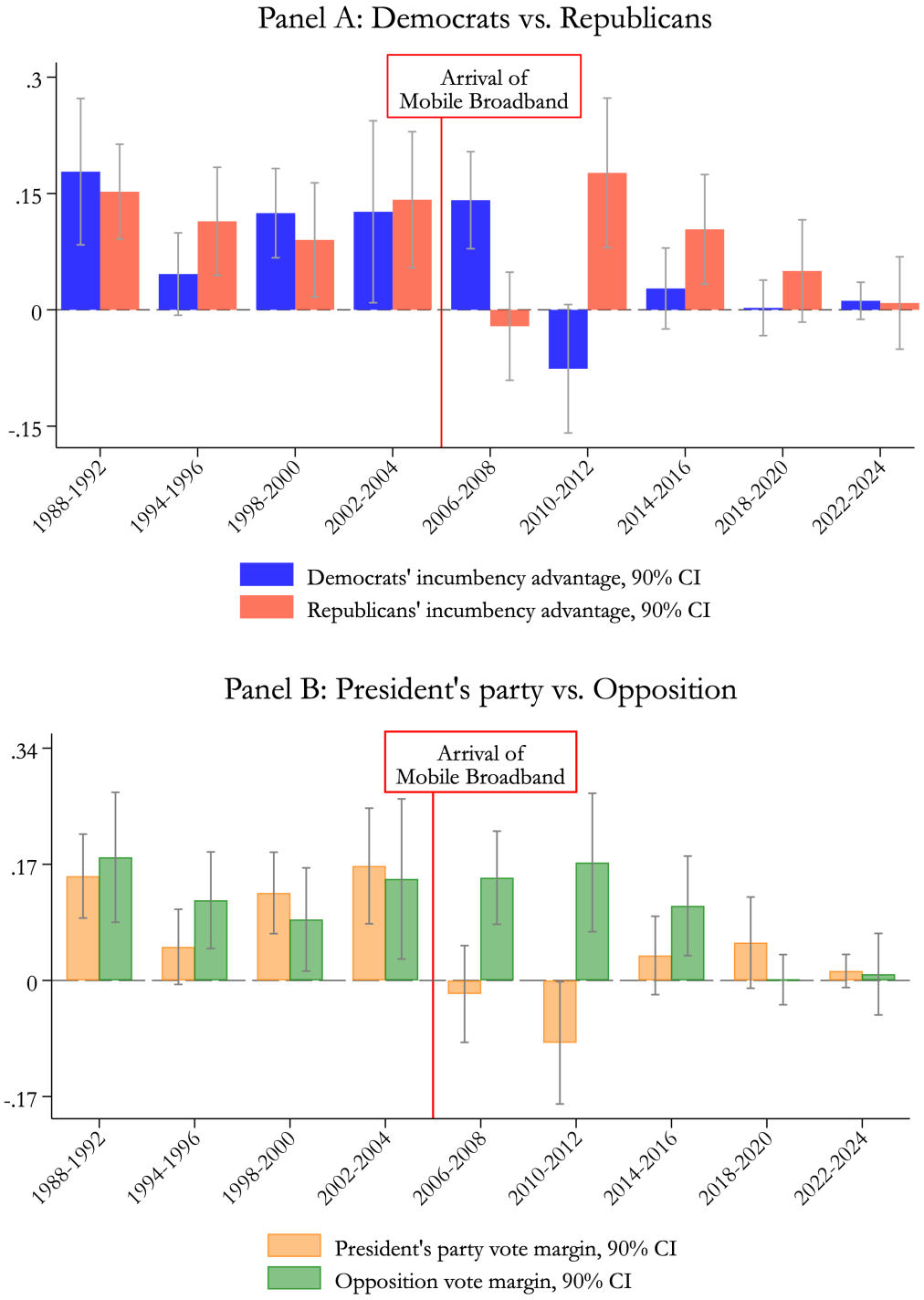


Figure A13: Incumbency Advantage Over Time, by Party

Note: The figure presents the detailed evolution of incumbency advantage for Democratic and Republican candidates (Panel A) and for candidates from the sitting president's party versus the opposition (Panel B). Controls include period-specific linear trends in the vote margin for the respective outcome variable in congressional district i in period $t-1$ (separately for races that Democrats won and lost). The sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$, and where the state did not experience redistricting between elections at time $t-1$ and time t. The standard errors are corrected for clusters at the level of the congressional districts.

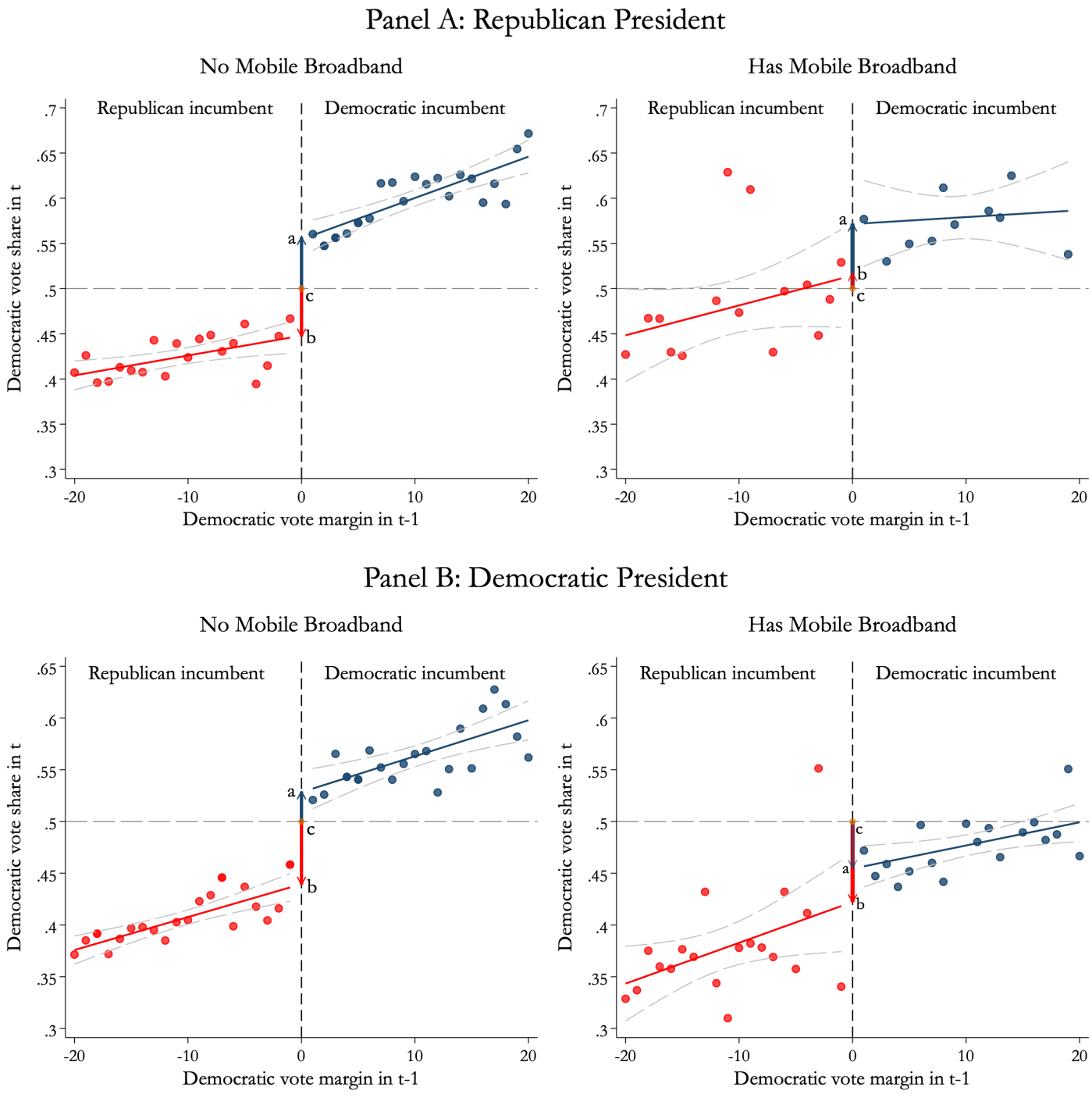


Figure A14: Initial Effects of Mobile Broadband (before 2012), by own vs. opposing party in the White House

Note: The figure presents the regression discontinuity plots for the vote share incumbency advantage by mobile broadband availability and the party in control of the White House, net of controls. See Appendix A.II for details on the measurement of party-specific incumbency advantage, measured through by a, b, and c. The sample consists of elections before 2012 featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in election $t-1$, and where the state did not experience redistricting between elections $t-1$ and t. Controls include year and congressional district fixed effects, linear trends in the Democratic Party's vote margin in the congressional district in election $t-1$ (separately for races that Democrats won and lost), and the direct effects of mobile broadband, separately for years with a Democratic and Republican president. The standard errors are corrected for clusters at the level of the congressional districts.

Appendix Tables

Table A1: Summary Statistics

Variable	Mean	St. Dev.	Observations	Source
Democratic vote share t	0.493	0.110	2,669	MIT Election Data
Democratic vote margin t	-0.013	0.220	2,669	MIT Election Data
Democratic winner t	0.476	0.500	2,699	MIT Election Data
Democratic incumbent t	0.484	0.500	2,699	MIT Election Data
Democratic vote margin $t-1$	-0.004	0.117	2,699	MIT Election Data
Incumbent running t	0.904	0.295	2,699	MIT Election Data
District has mob. broadband t:				
All years	0.407	0.491	2,699	Mobile Coverage Explorer
Before 2012	0.090	0.286	1,758	Mobile Coverage Explorer
District mob. broadband coverage t:				
All years	0.373	0.465	2,699	Mobile Coverage Explorer
Before 2012	0.060	0.215	1,758	Mobile Coverage Explorer
County mob. broadband coverage t	0.316	0.453	45,716	Mobile Coverage Explorer
ZIP code mob. broadband coverage t	0.817	0.361	323,673	Mobile Coverage Explorer
County-level incumbent vote share t	0.627	0.143	45,716	Dave Leip's Election Atlas
County-level challenger vote share t	0.352	0.142	45,716	Dave Leip's Election Atlas
Respondent voted for the incumbent	0.611	0.487	323,673	CES
Respondent voted for the challenger	0.382	0.486	323,673	CES
Disapproval of incumbents	0.372	0.483	118,131	CES
Knowledge of incumbent's ideology	0.548	0.498	120,119	CES
Knowledge of challenger's ideology	0.388	0.487	120,119	CES
Number of individual contributions:				
All contributions to incumbents	896.4	2004.4	1,093	DIME
All contributions to challengers	639.9	1219.3	1,093	DIME
Contributions below \$150 to incumbents	274.6	1761.9	821	DIME
Contributions below \$150 to challengers	222.4	802.0	821	DIME
Amount of individual contributions:				
All contributions to incumbents	454,096	627,419	1,093	DIME
All contributions to challengers	301,640	494,125	1,093	DIME
Contributions below \$150 to incumbents	15,905	77,012	821	DIME
Contributions below \$150 to challengers	11,767	34,682	821	DIME

Table A2: Time-Specific Optimal Bandwidths

	(1)
Dep. Var.:	Democratic vote share in election t
Time period t:	
$1976 < t \leq 1984$	0.176
$1984 < t \leq 1990$	0.181
$1990 < t \leq 1998$	0.152
$1998 < t \leq 2006$	0.207
$2006 < t \leq 2014$	0.199
$2014 < t \leq 2018$	0.218
$2018 < t \leq 2024$	0.205

Note: The table reports the period-specific optimal bandwidths estimated using the procedure suggested by Calonico et al. (2014) and Calonico et al. (2020). For each period, the sample consists of elections featuring both a Democratic and a Republican candidate in states that did not experience redistricting between elections at time $t-1$ and time t.

Table A3: Incumbency Advantage Over Time

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var.:	Democratic vote share in election t							
	All elections				Incumbent running			
Democrat won in $t-1$ $\times$								
$1974 < t \leq 1980$	0.103***	0.100***	0.112***	0.106***	0.115***	0.111***	0.119***	0.118***
	(0.016)	(0.019)	(0.016)	(0.020)	(0.016)	(0.020)	(0.017)	(0.021)
$1980 < t \leq 1988$	0.125***	0.122***	0.131***	0.130***	0.131***	0.128***	0.135***	0.129***
	(0.021)	(0.021)	(0.022)	(0.023)	(0.021)	(0.021)	(0.022)	(0.024)
$1988 < t \leq 1996$	0.106***	0.100***	0.098***	0.097***	0.110***	0.104***	0.108***	0.099***
	(0.010)	(0.011)	(0.010)	(0.010)	(0.010)	(0.011)	(0.010)	(0.010)
$1996 < t \leq 2004$	0.096***	0.117***	0.093***	0.121***	0.107***	0.117***	0.099***	0.120***
	(0.022)	(0.021)	(0.023)	(0.022)	(0.021)	(0.021)	(0.022)	(0.023)
$2004 < t \leq 2010$	0.047***	0.057***	0.058***	0.071***	0.047***	0.057***	0.058***	0.071***
	(0.015)	(0.012)	(0.014)	(0.012)	(0.015)	(0.013)	(0.014)	(0.012)
$2010 < t \leq 2018$	0.037*	0.041**	0.028	0.042**	0.038**	0.035**	0.024	0.026
	(0.019)	(0.017)	(0.020)	(0.017)	(0.016)	(0.016)	(0.017)	(0.017)
$2018 < t \leq 2024$	0.025***	0.017**	0.033***	0.031***	0.027***	0.020***	0.030***	0.032***
	(0.008)	(0.007)	(0.011)	(0.010)	(0.008)	(0.006)	(0.010)	(0.010)
Observations	2,699	1,983	2,665	1,930	2,440	1,824	2,404	1,768
Mean dep. var	0.493	0.490	0.493	0.489	0.477	0.469	0.476	0.468
Excluding redistricted districts		✓		✓		✓		✓
Congressional district FEs			✓	✓			✓	✓
Baseline controls	✓	✓	✓	✓	✓	✓	✓	✓

Note: This table presents the results of estimating Equation (1) for different time periods, for all elections (Columns 1–4) and focusing only on races where the incumbent is running (Columns 5–8). The unit of observation is a congressional district. The outcome variable is the Democratic Party's vote share in congressional district i in period t. Baseline controls include year fixed effects and linear trends in the Democratic Party's vote margin in congressional district i in period $t-1$, separately for races that Democrats won and lost and for each time period. In Columns 3–4 and 7–8, controls also include congressional district fixed effects. The sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$. In the even-numbered columns, the sample includes only states that did not experience redistricting between elections at time $t-1$ and time t. Standard errors in parentheses are corrected for clusters at the level of the congressional districts. *** p<0.01, ** p<0.05, * p<0.1.

Table A4: Mobile Broadband and Incumbency Advantage

	(1)	(2)	(3)	(4)	(5)
Dep. Var.:	Democratic vote share in election t				
Democrat won in $t-1$ ×					
× District has MB	-0.070***	-0.062***			
	(0.010)	(0.012)			
× District MB coverage			-0.071***		
			(0.015)		
× District got MB after $t+5$				-0.015	-0.017
				(0.010)	(0.012)
× District got MB in $t+5$				-0.012	-0.019
				(0.014)	(0.015)
× District got MB in $t+4$				-0.024	-0.019
				(0.022)	(0.025)
× District got MB in $t+3$				-0.033	-0.012
				(0.020)	(0.022)
× District got MB in $t+2$				-0.007	-0.005
				(0.017)	(0.021)
× District got MB in t				-0.076***	-0.066***
				(0.014)	(0.016)
× District got MB in $t-1$				-0.085***	-0.087***
				(0.015)	(0.021)
Observations	1,361	1,295	1,295	1,361	1,295
Mean dep. var	0.492	0.492	0.492	0.492	0.492
Excluding redistricted districts	✓	✓	✓	✓	✓
Congressional district FEs		✓	✓		✓
Baseline controls	✓	✓	✓	✓	✓

Note: MB = Mobile Broadband. This table presents the results of estimating Equation (2). The unit of observation is a congressional district. The outcome variable is the Democratic Party's vote share in congressional district i in period t. Baseline controls include year fixed effects, linear trends in the Democratic Party's vote margin in congressional district i in period $t-1$ (separately for races that Democrats won and lost), *Democrat won in* $t-1$, and the variables interacted with *Democrat won in* $t-1$. In Columns 2, 3, and 5, controls also include congressional district fixed effects. The sample consists of elections prior to 2012 featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$ in states that did not experience redistricting between elections at time $t-1$ and time t. Standard errors in parentheses are corrected for clusters at the level of the congressional districts. *** p<0.01, ** p<0.05, * p<0.1.

Table A5: Mobile Broadband and Incumbency Advantage, Incumbent Running for Reelection

	(1)	(2)	(3)	(4)	(5)
Dep. Var.:	Democratic vote share in election t				
Democrat won in $t-1$ ×					
× District has MB	-0.071***	-0.065***			
	(0.010)	(0.013)			
× District MB coverage			-0.075***		
			(0.016)		
× District got MB after $t+5$				-0.008	-0.010
				(0.010)	(0.012)
× District got MB in $t+5$				-0.009	-0.014
				(0.013)	(0.015)
× District got MB in $t+4$				-0.014	-0.011
				(0.021)	(0.023)
× District got MB in $t+3$				-0.039*	-0.026
				(0.020)	(0.022)
× District got MB in $t+2$				-0.009	-0.015
				(0.017)	(0.021)
× District got MB in t				-0.072***	-0.066***
				(0.014)	(0.016)
× District got MB in $t-1$				-0.090***	-0.087***
				(0.016)	(0.022)
Observations	1,262	1,190	1,190	1,262	1,190
Mean dep. var	0.492	0.493	0.493	0.492	0.493
Excluding redistricted districts	✓	✓	✓	✓	✓
Congressional district FEs		✓	✓		✓
Baseline controls	✓	✓	✓	✓	✓

Note: MB = Mobile Broadband. This table presents the results of estimating Equation (2) for elections where the incumbent ran for reelection. The unit of observation is a congressional district. The outcome variable is the Democratic Party's vote share in congressional district i in period t. Baseline controls include year fixed effects, linear trends in the Democratic Party's vote margin in congressional district i in period $t-1$ (separately for races that Democrats won and lost), *Democrat won in* $t-1$, and the variables interacted with *Democrat won in* $t-1$. In Columns 2, 3, and 5, controls also include congressional district fixed effects. The sample consists of elections prior to 2012 featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$ in states that did not experience redistricting between elections at time $t-1$ and time t. Standard errors in parentheses are corrected for clusters at the level of the congressional districts. *** p<0.01, ** p<0.05, * p<0.1.

Table A6: Mobile Broadband and Reelection Probability

	(1)	(2)	(3)	(4)	(5)
Dep. Var.:	Democratic candidate's win probability in election t				
Democrat won in $t-1$ ×					
× District has MB	-0.349***	-0.394***			
	(0.056)	(0.067)			
× District MB coverage			-0.450***		
			(0.101)		
× District got MB after $t+5$				-0.027	-0.057
				(0.043)	(0.057)
× District got MB in $t+5$				0.089	-0.069
				(0.065)	(0.077)
× District got MB in $t+4$				-0.031	-0.243*
				(0.126)	(0.142)
× District got MB in $t+3$				0.027	0.039
				(0.149)	(0.168)
× District got MB in $t+2$				0.013	-0.019
				(0.087)	(0.103)
× District got MB in t				-0.347***	-0.374***
				(0.076)	(0.091)
× District got MB in $t-1$				-0.401***	-0.588***
				(0.105)	(0.119)
Observations	1,361	1,295	1,295	1,361	1,295
Mean dep. var	0.465	0.464	0.464	0.465	0.464
Excluding redistricted districts	✓	✓	✓	✓	✓
Congressional district FEs		✓	✓		✓
Baseline controls	✓	✓	✓	✓	✓

Note: MB = Mobile Broadband. This table presents the results of estimating Equation (2) for outcome of reelection probability. The unit of observation is a congressional district. The outcome variable is the Democratic candidate's win probability in congressional district i in period t. Baseline controls include year fixed effects, linear trends in the Democratic Party's vote margin in congressional district i in period $t-1$ (separately for races that Democrats won and lost), *Democrat won in* $t-1$, and the variables interacted with *Democrat won in* $t-1$. In Columns 2, 3, and 5, controls also include congressional district fixed effects. The sample consists of elections prior to 2012 featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$ in states that did not experience redistricting between elections at time $t-1$ and time t. Standard errors in parentheses are corrected for clusters at the level of the congressional districts. *** p<0.01, ** p<0.05, * p<0.1.

Table A7: Mobile Broadband and Reelection Probability, Incumbent Running for Reelection

	(1)	(2)	(3)	(4)	(5)
Dep. Var.:	Democratic candidate's win probability in election t				
Democrat won in $t-1$ ×					
× District has MB	-0.348***	-0.361***			
	(0.059)	(0.072)			
× District MB coverage			-0.426***		
			(0.107)		
× District got MB after $t+5$				0.004	-0.015
				(0.044)	(0.059)
× District got MB in $t+5$				0.104*	-0.043
				(0.059)	(0.075)
× District got MB in $t+4$				0.050	-0.156
				(0.112)	(0.137)
× District got MB in $t+3$				-0.002	-0.048
				(0.148)	(0.162)
× District got MB in $t+2$				0.012	-0.031
				(0.086)	(0.102)
× District got MB in t				-0.324***	-0.328***
				(0.081)	(0.096)
× District got MB in $t-1$				-0.394***	-0.521***
				(0.111)	(0.125)
Observations	1,262	1,190	1,190	1,262	1,190
Mean dep. var	0.470	0.470	0.470	0.470	0.470
Excluding redistricted districts	✓	✓	✓	✓	✓
Congressional district FEs		✓	✓		✓
Baseline controls	✓	✓	✓	✓	✓

Note: MB = Mobile Broadband. This table presents the results of estimating Equation (2) for outcome of reelection probability focusing of elections where the incumbent was running for reelection. The unit of observation is a congressional district. The outcome variable is the Democratic candidate's win probability in congressional district i in period t. Baseline controls include year fixed effects, linear trends in the Democratic Party's vote margin in congressional district i in period $t-1$ (separately for races that Democrats won and lost), *Democrat won in* $t-1$, and the variables interacted with *Democrat won in* $t-1$. In Columns 2, 3, and 5, controls also include congressional district fixed effects. The sample consists of elections prior to 2012 featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$ in states that did not experience redistricting between elections at time $t-1$ and time t. Standard errors in parentheses are corrected for clusters at the level of the congressional districts. *** p<0.01, ** p<0.05, * p<0.1.

Table A8: Mobile Broadband and Incumbency Advantage, by Unemployment Increase in 2007–2010

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var.:	Democratic vote share in election t						
Election win in $t-1$ ×	-0.069***	-0.067***	-0.066***	-0.048***	-0.047***	-0.069***	-0.061***
× District has Mobile Broadband	(0.013)	(0.013)	(0.014)	(0.014)	(0.016)	(0.019)	(0.019)
District has Mobile Broadband ×			0.359				
× Unemployment rate change between 2007 and 2010			(0.416)				
Unemployment rate				0.000			
				(0.003)			
Election loss in $t-1$ × Unemployment rate					0.001		
					(0.003)		
Election win in $t-1$ × Unemployment rate					0.000		
					(0.003)		
Observations	1,097	1,097	1,097	624	624	559	538
Mean dep. var	0.491	0.491	0.491	0.486	0.486	0.495	0.486
Full sample	✓	✓	✓	✓	✓		
Below-median unemployment rate increase in 2007–2010						✓	
Above-median unemployment rate increase in 2007–2010							✓
Excluding redistricted districts	✓	✓	✓	✓	✓	✓	✓
All baseline controls	✓	✓	✓	✓	✓	✓	✓
Year FEs × Change in unemployment rate in 2007–2010		✓					

Note: This table presents the effects of mobile broadband on incumbency advantage, controlling for effects of unemployment rate changes during the Great Recession. The unit of observation is a congressional district. The outcome variable is the Democratic Party's vote share in congressional district i in period t. Controls include year and congressional district fixed effects, linear trends in the Democratic Party's vote margin in congressional district i in period $t-1$ (separately for races that Democrats won and lost), and the direct effects of mobile broadband. In Column 2, we additionally control for year fixed effects interacted with the change in the district's unemployment rate from 2007 to 2010. The sample consists of elections that took place prior to 2012, featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$ in states that did not experience redistricting between elections at time $t-1$ and time t. Column 6 presents the results for the subsample of districts that experienced a below-median increase in the unemployment rate from 2007 to 2010. Column 7 presents the results for the subsample of districts that experienced an above-median increase in the unemployment rate from 2007 to 2010. Standard errors in parentheses are corrected for clusters at the level of the congressional districts. *** p<0.01, ** p<0.05, * p<0.1.

Table A9: Mobile Broadband and Incumbency Advantage, by Housing Price Decline in 2007–2010

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var.:	Democratic vote share in election t						
Democrat won in $t-1$ ×	-0.063***	-0.059***	-0.059***	-0.059***	-0.058***	-0.069***	-0.047**
× District has Mobile Broadband	(0.012)	(0.012)	(0.012)	(0.018)	(0.018)	(0.015)	(0.019)
District has Mobile Broadband ×			0.005				
× Median housing price change from 2007 to 2010			(0.023)				
Median housing price				-0.014*			
				(0.007)			
Election loss in $t-1$ × Median housing price					-0.013*		
					(0.008)		
Election win in $t-1$ × Median housing price					-0.016		
					(0.010)		
Observations	1,276	1,276	1,276	327	327	643	633
Mean dep. var	0.491	0.491	0.491	0.487	0.487	0.493	0.490
Full sample	✓	✓	✓	✓	✓		
Above-median housing price decline in 2007–2010						✓	
Below-median housing price decline in 2007–2010							✓
Excluding redistricted districts	✓	✓	✓	✓	✓	✓	✓
All baseline controls	✓	✓	✓	✓	✓	✓	✓
Year FEs × Change in housing prices in 2007–2010		✓					

Note: This table presents the effects of mobile broadband on incumbency advantage, controlling for effects of housing price changes during the Great Recession. The unit of observation is a congressional district. The outcome variable is the Democratic Party's vote share in congressional district i in period t. Controls include year and congressional district fixed effects, linear trends in the Democratic Party's vote margin in congressional district i in period $t-1$ (separately for races that Democrats won and lost), and the direct effects of mobile broadband. In Column 2, we additionally control for year fixed effects interacted with the change in the district's housing prices from 2007 to 2010. The sample consists of elections that took place prior to 2012, featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$ in states that did not experience redistricting between elections at time $t-1$ and time t. Column 6 presents the results for the subsample of districts that experienced an above-media decline in housing prices from 2007 to 2010. Column 7 presents the results for the subsample of districts that experienced a below-median decline in housing prices from 2007 to 2010. Standard errors in parentheses are corrected for clusters at the level of the congressional districts. *** p<0.01, ** p<0.05, * p<0.1.

Table A10: Event Study Estimates, by Unemployment Increase and Housing Price Decline in 2007–2010

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.:	Democratic vote share in election t					
Heterogeneity analysis by:	Unemployment rate change in 2007–2010			Housing price change in 2007–2010		
Democrat won in $t-1$ ×						
× Dist. got MB after $t+5$	-0.017	0.002	-0.029*	-0.016	-0.006	-0.027*
	(0.013)	(0.020)	(0.016)	(0.012)	(0.019)	(0.016)
× Dist. got MB in $t+5$	-0.012	0.028	-0.036*	-0.015	-0.026	-0.001
	(0.016)	(0.028)	(0.019)	(0.015)	(0.022)	(0.021)
× Dist. got MB in $t+4$	-0.019	-0.037	0.021	-0.017	0.002	-0.061*
	(0.030)	(0.034)	(0.045)	(0.025)	(0.032)	(0.033)
× Dist. got MB in $t+3$	-0.018	0.006	-0.033	-0.010	0.012	-0.012
	(0.022)	(0.034)	(0.030)	(0.022)	(0.054)	(0.025)
× Dist. got MB in $t+2$	-0.005	0.032	-0.034	-0.003	0.029	-0.038
	(0.024)	(0.029)	(0.038)	(0.021)	(0.028)	(0.029)
× Dist. got MB in t	-0.072***	-0.065**	-0.078***	-0.067***	-0.074***	-0.046**
	(0.017)	(0.025)	(0.024)	(0.016)	(0.022)	(0.023)
× Dist. got MB in $t-1$	-0.095***	-0.062*	-0.118***	-0.085***	-0.078***	-0.100***
	(0.023)	(0.033)	(0.030)	(0.021)	(0.025)	(0.039)
Observations	1,097	538	559	1,276	643	633
Mean dep. var	0.491	0.495	0.486	0.491	0.493	0.490
Full sample	✓			✓		
Above-median effect of Great Recession		✓			✓	
Below-median effect of Great Recession			✓			✓
Excl. redist. districts	✓	✓	✓	✓	✓	✓
All controls	✓	✓	✓	✓	✓	✓

Note: MB = Mobile Broadband. This table presents the results of estimating Equation (2) for subgroups differentially affected by the Great Recession. The unit of observation is a congressional district. The outcome variable is the Democratic Party's vote share in congressional district i in period t. Columns 1–3 focus on heterogeneity with respect to changes in the unemployment rate between 2007 and 2010; Columns 4–6 analyze the heterogeneity with respect to changes in housing prices. Baseline controls include year and congressional district fixed effects, linear trends in the Democratic Party's vote margin in congressional district i in period $t-1$ (separately for races that Democrats won and lost), *Election win in period* $t-1$, and the variables interacted with *Election win in period* $t-1$. The sample consists of elections before 2012, featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$ in states that did not experience redistricting between elections at time $t-1$ and time t. Standard errors in parentheses are corrected for clusters at the level of the congressional districts. *** p<0.01, ** p<0.05, * p<0.1.

Table A11: Incumbency Advantage Over Time, Period-Specific Optimal Bandwidths

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var.:	Democratic vote share in election t							
	All elections				Incumbent running			
Democrat won in $t-1$ ×								
$1974 < t \leq 1980$	0.107***	0.95***	0.118***	0.106***	0.117***	0.106***	0.124***	0.117***
	(0.017)	(0.020)	(0.018)	(0.021)	(0.017)	(0.020)	(0.018)	(0.022)
$1980 < t \leq 1988$	0.127***	0.124***	0.135***	0.132***	0.131***	0.128***	0.136***	0.130***
	(0.022)	(0.022)	(0.024)	(0.024)	(0.022)	(0.022)	(0.024)	(0.025)
$1988 < t \leq 1996$	0.106***	0.104***	0.098***	0.099***	0.106***	0.103***	0.104***	0.097***
	(0.012)	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
$1996 < t \leq 2004$	0.096***	0.116***	0.091***	0.119***	0.106***	0.114***	0.095***	0.116***
	(0.021)	(0.020)	(0.022)	(0.021)	(0.020)	(0.020)	(0.021)	(0.022)
$2004 < t \leq 2010$	0.048***	0.058***	0.061***	0.072***	0.055***	0.061***	0.068***	0.078***
	(0.016)	(0.012)	(0.014)	(0.012)	(0.015)	(0.013)	(0.014)	(0.012)
$2010 < t \leq 2018$	0.041**	0.050***	0.035*	0.052***	0.048***	0.047***	0.036**	0.038**
	(0.018)	(0.017)	(0.019)	(0.017)	(0.015)	(0.016)	(0.017)	(0.017)
$2018 < t \leq 2024$	0.028***	0.016**	0.035***	0.028***	0.029***	0.019***	0.030***	0.027***
	(0.008)	(0.007)	(0.011)	(0.009)	(0.008)	(0.006)	(0.010)	(0.010)
Observations	2,574	1,902	2,539	1,846	2,323	1,747	2,285	1,688
Mean dep. var	0.492	0.490	0.492	0.490	0.491	0.489	0.491	0.489
Excluding redistricted districts		✓		✓		✓		✓
Congressional district FEs			✓	✓			✓	✓
Baseline controls	✓	✓	✓	✓	✓	✓	✓	✓

Note: This table presents the results of estimating Equation (1) for different time periods, using time-specific optimal bandwidths reported in Appendix Table A2. The outcome variable is the Democratic Party's vote share in congressional district i in period t across all elections (Columns 1–4) and focusing on races where the incumbent was running (Columns 5–8). Baseline controls include year fixed effects and linear trends in the Democratic Party's vote margin in congressional district i in period $t-1$, separately for races that Democrats won and lost and each time period. In Columns 3–4 and 7–8, controls also include congressional district fixed effects. The sample consists of elections featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$. In the even-numbered columns, the sample includes only states that did not experience redistricting between elections at time $t-1$ and time t. Standard errors in parentheses are corrected for clusters at the level of the congressional districts. *** p<0.01, ** p<0.05, * p<0.1.

Table A12: Mobile Broadband and Incumbency Advantage, Period-Specific Optimal Bandwidths

	(1)	(2)	(3)	(4)	(5)
Dep. Var.:	Democratic vote share in election t				
Democrat won in $t-1$ ×					
× District has MB	-0.071***	-0.056***			
	(0.010)	(0.012)			
× District MB coverage			-0.063***		
			(0.015)		
× District got MB after $t+5$				-0.014	-0.008
				(0.011)	(0.012)
× District got MB in $t+5$				-0.015	-0.015
				(0.014)	(0.016)
× District got MB in $t+4$				-0.014	-0.011
				(-0.020)	(-0.014)
× District got MB in $t+3$				-0.036*	-0.013
				(0.020)	(0.021)
× District got MB in $t+2$				-0.003	0.004
				(0.017)	(0.020)
× District got MB in t				-0.077***	-0.055***
				(0.015)	(0.016)
× District got MB in $t-1$				-0.085***	-0.074***
				(0.016)	(0.020)
Observations	1,243	1,176	1,176	1,243	1,176
Mean dep. var	0.491	0.492	0.492	0.491	0.492
Excluding redistricted districts	✓	✓	✓	✓	✓
Congressional district FEs		✓	✓		✓
Baseline controls	✓	✓	✓	✓	✓

Note: MB = Mobile Broadband. This table presents the results of estimating Equation (2), using time-specific optimal bandwidths reported in Appendix Table A2. The unit of observation is a congressional district. The outcome variable is the Democratic Party's vote share in congressional district i in period t.Baseline controls include year fixed effects, linear trends in the Democratic Party's vote margin in congressional district i in period $t-1$ (separately for races that Democrats won and lost), *Democrat won in* $t-1$, and the variables interacted with *Democrat won in* $t-1$. In Columns 2, 3, and 5, controls also include congressional district fixed effects. The sample consists of elections prior to 2012 featuring both a Democratic and a Republican candidate in districts where the Democratic Party's margin of victory or defeat was less than 20 percentage points in period $t-1$ in states that did not experience redistricting between elections at time $t-1$ and time t. Standard errors in parentheses are corrected for clusters at the level of the congressional districts. *** p<0.01, ** p<0.05, * p<0.1.