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A Natural Experiment Using Spatial
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ABSTRACT

Persuading Voters with Partisan TV News: A Natural Experiment Using Spatial Reception Data*

We estimate the causal effect of partisan media on voter behavior by exploiting a natural experiment in which Sky News Australia – a conservative 24-hour news channel – became freely available to 8 million people. Using comprehensive national polling-station-level electoral data and broadcast signal strength variation, we implement a continuous treatment difference-in-differences design comparing voting patterns in areas with and without access to the channel before and after its September 2018 free-to-air launch. We find that exposure to partisan media increased the conservative party's lead by 1.5 percentage points in Australia's 2019 federal election. These findings shed light on the role of partisan media in shaping electoral outcomes by influencing swing voters, not just by affecting who turns out to vote.

JEL Classification: D72, L82, R19

Keywords: partisan news, elections, spatial economics

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1. Introduction

Like Fox News in the U.S., Sky News Australia is a 24-hour news channel owned by Rupert Murdoch that is widely accused of bias. Originally available only via subscription-based pay-television service, ratings at the time Murdoch acquired the channel were low with fewer than 12,000 nightly viewers nationally (Meade 2016). However, in September 2018 Sky News Australia reached an agreement with the WIN Television Network to broadcast as a free-to-air service to the almost 8 million Australians (almost one third of the Australian population) living in the WIN broadcast license area. We use the natural experiment provided by this change in accessibility to estimate the effect of free-to-air Sky News on the vote swing between the 2016 and 2019 national elections. By assembling a unique dataset on all electoral polling places in Australia, and the share of the voting population receiving the Sky News broadcast signal, we perform a difference-in-differences analysis to measure the impact of partisan news on voting behavior.

In recent decades the audience share of partisan news media has grown, especially among TV audiences (Fletcher, Cornia and Nielsen 2020; Muise *et al.* 2022). A nascent literature suggests that partisan news media does indeed affect electoral outcomes.¹ DellaVigna and Kaplan (2007) use variation in the availability of Fox News across cable networks finding significant effects on Republican vote share and turnout in the 2000 U.S. presidential election.² Martin and Yurukoglu (2017) use cable channel positions as an exogenous shifter of viewership finding that, while most Fox News viewers are Republican voters, just three minutes of

¹ This is part of a broader literature on the influence of TV media on behavior. Chong and La Ferrara (2009) show telenovelas influenced divorce rates in Brazil; while La Ferrara *et al.* (2008) find they also affected fertility choices. See also Jensen and Oster (2009), Paluck (2009) and Green *et al.* (2020).

² The authors note some fragility in this finding, noting that the relationship is not observable unless the sample is pruned by 238 observations where number of precincts aggregated to the town-level differs by more than 20 percent between 1996 and 2000 and additional controls for the number of channels and potential subscribers are included.

exposure per week increases Democratic viewers likelihood of voting Republican by one percentage point; a very large effect. Effect of partisan news media has also been shown in the context of Putin's first election in Russia (Enikolopov, Petrova and Zhuravskaya 2011); and the influence of anti-Roosevelt radio personality Father Coughlin in the 1936 U.S. presidential election (Wang, 2021).³

To the best of our knowledge, no studies have yet considered effect of partisan news on electoral outcomes in a parliamentary democracy, which are globally more common than presidential democracies (Cheibub *et al.* 1996; McManus and Ozkan 2018). The impact of partisan news may differ in a parliamentary democracy where specific local candidates and party play a relatively more important role in shaping voter preferences than the appeal of a single national candidate. It has long been argued that presidential democracies are more conducive to polarization than parliamentary systems (Linz 1990).

Moreover, in the USA, the empirical context of the most compelling studies to date, election outcomes are strongly influenced by who turns out to vote (Mayer 2008; Panagopoulos 2016; Hill 2017). This makes it difficult to assess whether partisan news media can induce a politically relevant number of people to shift their vote from one party to another. The causal pathway between partisan news and voter turnout is uncontroversial, and fits with a range of established stylized facts. It is well established that audiences overwhelmingly choose to consume news media that already align with their pre-existing views, a phenomenon known as selective exposure (Iyengar and Hahn 2009; Stroud 2011; Arceneaux and Johnson, 2013; Martin and Yurukoglu 2017); selective exposure to (partisan) news fosters polarization

³ For reviews of the electoral effects of media see DellaVigna and Gentzkow 2010, Prat and Strömberg 2013, Enikolopov and Petrova 2015, Zhuravskaya, Petrova and Enikolopov 2020.

(Arceneaux and Johnson, 2013; Casas, Menchen-Trevino and Wojcieszak 2023); and polarization is associated with voter turnout (Kamm and Schram 2013).

Whether voluntary consumption of partisan news can flip voters from one party to another is less clear. Unlike experimental settings whereby exposure is controlled, or political advertising interspersed between cross-cutting entertainment or sport, viewers of 24-hour news channel are voluntary consumers. Inducing voters to flip which party they vote for requires that voters of a given persuasion voluntarily consume cross-cutting news media and also for that exposure to influence their beliefs. Of these preconditions, voluntary exposure is reasonably intuitive, since evidence suggests that those closer to the middle of the ideological spectrum, with weaker political conviction, are typically more open to engaging with a broader range of sources (Mitchell *et al.* 2014; Jurkowitz *et al.* 2020). It remains an untested empirical question whether a significant group of politically important voters will choose to consume strongly partisan news when available.

The impact of cross-cutting news on changing minds – or at least voter behavior – is more contested. On one hand, the theory of motivated reasoning predicts that information that contradicts prior positions will be dismissed, discredited, or re-interpreted to align with existing beliefs (Kunda 1990).⁴ Partisan motivated reasoning is well documented (Bolsen, Druckman, and Cook, 2014). On the other hand, Broockman and Kella (2023) argue that sustained exposure to cross-cutting content that is rich in factual information can induce viewers to revisit priors. Their large scale randomized controlled trial suggests that the views of regular Fox News viewers can in fact be moderated by regular exposure to cross-cutting media (i.e. CNN).

⁴ Pre-empted by Sinclair (1935) “It is difficult to get a man to understand something when his salary depends on his not understanding it.”

Other studies have been less sanguine about the potential of cross cutting media to change minds (Casas, Menchen-Trevino and Wojcieszak, 2023).

Australia is in many ways the ideal context from which to better understand the impact of partisan news on the margin of shifting votes from one party to another. Voter turnout in national elections has been over 90 percent for almost a century – among the highest in the world. Voting is compulsory with failure to vote punishable by a nominal fine. Equally important are uniform, automatic voter enrolment, the absence of voter ID requirements, holding elections on Saturdays, and legislated rights for workers to be given time off to vote. The Australian Electoral Commission (AEC), on whom the onus rests to ensure all citizens have the opportunity to vote, provide over 7000 polling places on election day (one polling station for every 2,000 eligible voters); more than 500 mobile voting teams; special polling places in hospitals and prisons and extensive options for pre-polling in person or by mail. Due to Australia's high turnout, winning elections requires convincing swing voters rather than just mobilizing supporters to vote.

Using a natural experiment in the context of Australia, we contribute to the literature on the effect of partisan news media on electoral outcomes. We estimate a continuous treatment difference-in-differences model where identification rests on variation in Sky News signal strength within electoral divisions. Broadcast signal strength, which depends both on distance to transmitters and topographic and geographic factors that affect signal propagation in a quasi-random manner, is increasingly used to understand the effect of media consumption on a range of behavioral phenomena (Olken 2009; Chong and La Ferrara 2009; Yanagizawa-Drott 2014; Okuyama 2021). Following recent advances in continuous treatment difference-in-differences (de Chaisemartin and D'Haultfoeuille, 2024; Callaway, Goodman-Bacon and Sant'Anna, 2024), we verify the key identification assumptions underlying our approach.

We find that free-to-air Sky News broadcast caused the Liberal National Party (LNP) lead over the Australian Labor Party (ALP) to increase by 1.5 percentage points, which is consistent with the partisan direction of Sky News. This effect comprises a fall in support for ALP and an increase in support for the LNP. We find no effect of Sky News on invalid (informal) vote share.⁵ Statistical testing for homogeneous treatment and parallel trends proposed by de Chaisemartin and D'Haultfoeuille (2024) support the validity of our specification. Simulating the effects of Sky News suggest that in the absence of Sky News exposure, the LNP would have won one less electoral division and therefore held an outright parliamentary majority by one instead of two seats.

2. Institutional Context: Media Landscape and Electoral System

To identify the effect of partisan news media on voter behavior, we exploit variation in households' access to Sky News on free-to-air (FTA) television in the leadup to the 2019 national election. In brief, access depends on adequate signal strength from a terrestrial broadcast tower transmitting Sky News, or for residents of Western Australia, household eligibility for government subsidized satellite TV. In this section, we explain how channel mix varies by broadcast tower location and how Sky News came to be broadcast from towers serving license areas covering approximately one-third of the Australian population nine months before the 2019 election. Finally, we outline salient features of the Australian electoral system.

⁵ In Australia invalid ballots are called informal. These are ballots that cannot be counted due to incorrect marking, missing numbers, or being left blank.

a. Australian Television News Markets

Until very recently, free-to-air broadcast has been the dominant form of television consumption in Australia. In 2018 and 2019, within our period of analysis, Australians consumed 3.4 times more FTA than pay television and more than twice as much FTA than video on demand (ACMA 2023). Only 27 percent of Australian adults watched any form of pay TV in each of the years 2017, 2018 and 2019 (ACMA 2022).⁶ Take up rates of pay TV were even lower outside the largest state capitals (ACCAN 2022). In contrast, more than 99 percent of Australians have access to FTA TV via either terrestrial broadcast or government funded satellite TV, which provides digital infill for viewers in terrestrial blackspots and viewers in more remote areas of Australia (known as Viewer Access Satellite TV, VAST).

FTA TV provide households a mix of commercial channels that differ by location as well as channels provided by the Government owned but editorially independent Australian Broadcast Corporation (ABC).⁷ Historically ABC broadcast channels included a mix of both news and entertainment programming. In 2010 ABC News-24 was launched, Australia's first FTA 24-hour news program which was the most widely consumed dedicated news channel in 2019. For households receiving terrestrial broadcast signals, the available FTA channel mix depends on the broadcasting tower, which is determined by the license area the tower is nominally intended to serve. From September 2018 Sky News was included in the channel mix for towers broadcasting the WIN television network.

⁶ Low take up of pay TV (or subscription TV, STV) in Australia is attributed in part to its relatively late introduction, but also to legislation which prevented STV from licencing a wide range of major sporting events, which had been key in boosting subscription services in other regions of the world (Thurlow 2022).

⁷ Other channels are provided by Special Broadcasting Service (SBS) an independent non-government service founded to provide content in languages other than English, and National Indigenous Television.

The WIN broadcast license area covers a population of almost 8 million people, living across a diverse geography encompassing the entire state of Tasmania including its capital (Hobart, pop. 200,000); and the entire Australian Capital Territory including Canberra (pop. 395,000); and areas spanning remote communities to regional cities such as Newcastle (population 322,000). License areas covered by WIN do not include the 5 largest metropolitan catchments of Sydney, Melbourne, Brisbane, Adelaide, and Perth. In practice, signal propagation does not conform perfectly to license area boundaries and several areas of metropolitan cities, including central southern Sydney also receive a good signal from WIN towers (e.g., Matraville and Maroubra).

Households that do not receive reliable terrestrial TV reception, either due to distance from a transmitter or issues relating to local interference, can access a government funded satellite service called VAST. There are two VAST broadcast area licensees, one covering the State of Western Australia and the other covering north, central and eastern Australia.⁸ Programming varies between the two regions and only VAST viewers in the state of Western Australia had access to Sky News Australia.

b. Sky News Australia

Sky News Australia – Australia’s first commercial 24-hour news channel – was launched as a subscription-only pay TV in 1996 as joint venture between British BSkyB and Australian commercial networks (Seven and Nine). In December 2016 Sky News Australia⁹ was acquired by News Corp Australia, a wholly owned subsidiary of News Corp (US). After the takeover Sky News Australia had no direct ties to its UK namesake. Ratings immediately after the

⁸ There are three VAST license areas VAN Northern Australia, VAN Southeastern Australia and SVW Western Australia. The first two are both licenced to the same entity. See Thurlow (2022, Table 11.1).

⁹ Sky News Australia parent company Australian News Channel.

Murdoch takeover remained low, reflecting the low overall take-up of subscription (pay) TV in Australia. On election night in 2016, Sky News Australia audience was barely 5 percent of the 2 million viewers who tuned in to ABC News, the most widely watched news content nationally (Bodey 2016; Meade 2016; Muller 2016). Additionally, in the period of analysis, Sky News social media presence was minimal, having uploaded no videos at all to its YouTube channel between February 2017 and April 2019 (Wilson 2020).¹⁰

Following the Murdoch takeover, Sky News shifted towards a conservative partisan stance.¹¹ Text analysis of a 3-day period found negative depiction of Labor (nominally left) at 7:1 as compared to the conservative party (Stapleton 2019). Media Bias Fact Check reports Sky News to be “Right-Biased based on story selection and editorial positions that mostly favor the right.” They also report Sky News broadcasts misinformation and the promotion of conspiracy theories. For example, claiming the 2020 US presidential election was ‘stolen’ (Davies 2021). In 2021, Sky News was suspended from YouTube for spreading coronavirus misinformation (Pannett 2021).¹²

c. Expansion of Sky News Broadcast on the WIN Network.

In 2018 Sky News Australia signed an agreement with the WIN television network to broadcast on their FTA broadcast license area and partner channels (Mason, 2018; MediaWeek 2018). In exchange for content, Sky News were to receive revenue share, access to WIN News localized

¹⁰ In July 2019, 2 months after the national election, Sky News began expanding its social media presence, hiring a new digital editor and signing agreements with both YouTube and Facebook in August (Wilson 2020).

¹¹ Young (2009) suggests that the initial incarnation of Sky News Australia was modelled on its British counterpart, widely viewed to be impartial.

¹² We acknowledge that Sky News' conservative stance may not be universally described as bias; our result that partisan media influences voters only require its rightward position relative to mainstream media, regardless of whether this is perceived as bias or balance.

content for use in both their FTA and STV offerings;¹³ and opportunities for cross-promotion subscription offerings (Mason 2018; Samios 2017).¹⁴

The specific pairing of Sky News and WIN appears to be effectively random. In fact, in 2017 Sky News launched an unsuccessful bid for control of (metropolitan) Network 10 with the intent of broadcasting over metropolitan markets (Kelly 2017; Mason 2018). Also serendipitous was the fact that WIN's decades old supply agreement¹⁵ with Channel Nine broke down in 2016 following an unrelated legal dispute¹⁶ leaving WIN struggling to fill airtime – in one license region even resorting to broadcasting rolling images of scenery and elevator music (Thurlow, 2022, p404).¹⁷ While the role of the content supply agreement breakdown in the decision to syndicate Sky News to WIN is somewhat speculative, it is noteworthy that in 2021 when WIN entered a renewed agreement with longstanding partner Channel Nine, Sky News was displaced from WIN (Meade 2021; Sky News 2021).¹⁸

Irrespective of its genesis, the partnership with WIN dramatically expanded the potential viewer base of Sky News to the tune of an additional 8 million Australians living in the WIN broadcast region. Available evidence confirms the extent of the increase in viewers: 3.8 million people tuned in to Sky News via the WIN network in 2019¹⁹ (Knox, 2019). And,

¹³ At the time WIN was the largest producer of regional commercial television news (Thurlow 2022).

¹⁴ WIN television is a privately owned company majority owned by Bruce Gordon, there is no public annual report. Statements at the time emphasised access to content for regional viewers (MediaWeek 2018).

¹⁵ Content supply agreements are common in Australian regional FTA TV. Reforms from 1989 led to consolidation, resulting in three main regional FTA networks: WIN, Prime, and Southern Cross. Each network affiliated with a metropolitan counterpart, with WIN partnering with Nine. For more history of regional television, see Thurlow (2022) and Barnett (2023).

¹⁶ WIN had sued Nine, claiming that Nine breached their affiliation agreement by providing licenced content on a new online catch-up service (9Now). Commentator suggested this litigation was itself a response to negotiations over revenue share on the renewed content agreement in 2015 (Samios 2020)

¹⁷ WIN entered a contract supply agreement with Network 10 in 2017.

¹⁸ However, soon after Sky News rebranded as Sky News Regional, and was launched on August 1 on competing regional network, Southern Cross.

¹⁹ In TV ratings, reach is typically defined as the number of people who have watched a channel or a program for at least one minute over a given period (here, 27 January – 09 November 2019),

in the week prior to the 2019 election Sky News ratings on FTA were similar to and sometimes eclipsing the ABC (REGTAM 2019).²⁰

d. The Australian electoral system and the 2019 National Election

Australia is a parliamentary democracy with a political system modelled on that of the UK. The party with the greatest representation in the legislature forms government and its leader the head of government (Prime Minister). National elections are conducted approximately once every three years.²¹

Voter turnout in Australia is high and stable: 91.9 percent in 2016 national election and 92.5 percent in 2019 (AEC 2023b). High voter turnout is the consequence of several factors. Voting is compulsory for all eligible Australian citizens and non-compliance results in a nominal fine. National elections are conducted by the Australian Electoral Commission (AEC), on whom the onus rests to ensure all citizens have the opportunity to vote. Elections are held on a Saturday and employers required by law to give workers time to vote (Commonwealth Electoral Act 1918, s345). Voter enrolment is essentially uniform, there are no identification requirement, and voters can cast their ballot at one of more than 7,000 polling places on election day (one polling station for every 2,000 eligible voters, on average), mobile voting teams stationed at hospitals and prisons, via mail or at AEC operated Early Voting Centres in each electoral division.

Another distinctive feature of Australian Electoral system is ranked choice voting, known in Australia as preferential voting, which functions like an automatic run-off. Voters

²⁰ We were not given permission to cite REGTAM data, however we refer the interested reader to weekly ratings freely available on the REGTAM website (<https://www.regionaltam.com.au>) and, in particular, to the election week ratings (<https://www.regionaltam.com.au/upload/weekly-reports/RegTAM-20190512-E2RegFTARankSumCons.pdf>, accessed on 8/12/2023).

²¹ On a date determined by the Governor-General, on the request of the government of the day.

rank candidates in order of preference on their ballots. If no candidate secures more than 50 percent of first-preference votes, the candidate with the fewest votes is eliminated, and their votes are redistributed to the remaining candidates based on the second preferences indicated on the ballots. This process of elimination and redistribution continues until one candidate achieves a majority. Preferential voting has two consequences: the first is to reduce strategic voting and the second is that it has resulted in a legislature dominated by two major parties. The two parties are the ALP nominally on the left, and the Liberal Party, on the right. The Liberal Party operate in a perennial alliance with another conservative party, the Nationals (formerly the Country Party), though in some electorates both the Nationals and the Liberal party field competing candidates. In the state of Queensland, the two conservative parties have formally merged to form the LNP. At the time of the 2019 election the LNP had been in government since 2013 and had 76 seats out of a legislature of 151 electoral divisions: an outright majority of just one seat.

Electoral divisions range in size from approximately 70,000 to 125,000 voters. Electoral boundaries are revised where required to ensure that each State and territory has representation in the lower house proportional to their population and that there are a similar number of electors in each electoral division for a given state or territory. Boundary revisions (known in Australia as redistributions) are undertaken by the stridently apolitical Australian Electoral Commission (AEC). The Parliament has no power to reject or amend an AEC redistribution (AEC 2014). Boundary changes are minimized but aim to maintain socially and economically integrated electoral divisions with shared community interests and strong transport and communication links (AEC 2022). Between the 2016 and 2019 national elections the number of electoral divisions increased from 150 to 151.²² The boundaries of the 151

²² Victoria and the ACT each gained one electoral division while SA lost one electoral division.

electoral divisions are indicated in Figure 1 with insets for each of the 8 capitals cities across Australia's States and territories.

3. Data

a. Election Outcome Data

Election result data for the House of Representatives for each polling place come from the AEC (2022). We include both regular polling places and early voting centers,²³ but exclude mobile polling stations, hospital polling stations and postal votes as the voting population at each of these polling places is likely to significantly change between elections. After merging the data (see Appendix A), we begin with data covering nearly 8,200 polling places, accounting for 11.7 million ballots or 93% of ordinary votes.

Our main outcome variable is the LNP lead over the ALP in first preference votes, expressed as a percentage of total votes.²⁴ This captures voters' relative preferences between the two major parties. Electoral lead accounts for the possibility that partisan news might shift first preference votes away from both ALP and LNP to independent candidates (or minor parties) at different rates, potentially widening the gap between the LNP and ALP. For completeness, we also report results for the effect of Sky News on LNP and ALP vote share directly.

Our second main outcome variable is the two-party preferred (TPP) vote share which also combines the relative flow of votes to LNP vs ALP. Recall that Australia uses preferential (ranked choice) voting, whereby voters rank candidates from most to least preferred. If no

²³ We include both regular polling places and early voting centres. Ballots can be cast at early voting centres by voters who cannot readily get to a polling place on election day.

²⁴ $Lead^{LNP} = \frac{Votes_{LNP2019} - Votes_{ALP2019}}{Total_Votes_{2019}}$

candidate secures over 50% of first-preference votes, the candidate with the fewest votes is eliminated, and their votes are redistributed based on second preferences marked on those ballots. This continues until two candidates remain. The TPP count at the electoral division level determines the election outcome, it also potentially captures subtle shifts in preferences between the major parties, taking into account any impact on preferencing third party candidates. Note that swings in the LNP lead over ALP in first preferences do not necessarily translate 1:1 to shifts in TPP, since the TPP gap also includes the preferences of voters who voted for an eliminated third-party candidate (or independent).

An important caveat to measuring TPP at the polling place level is that the elimination order applied in calculating TPP at each polling place follows the ranking of candidates established at the level of the electoral division in aggregate and introduces some noise since these do not necessarily match preferences on ballots cast at specific polling places. To estimate the treatment effect on TPP, we use TPP data at polling places provided by the AEC. We exclude the 15 electoral divisions where the runoff was not between the ALP and the LNP for the analysis of TPP.²⁵

b. Share of Voters with FTA Sky News Reception

Our treatment variable is the percentage of voters at each polling place with Sky News reception at their place of residence. We estimate this by combining two datasets: voter residential locations for each polling place and detailed geospatial models of broadcast signal strength across Australia.

²⁵ We also exclude the electoral division of Whitlam from the TPP estimates, due to an error in AEC data for the TPP measure for that electoral division.

Signal strength data come from the Australian Communications and Media Authority (ACMA 2017a), an independent federal government agency. Signal strength is based on the Longley-Rice Propagation model incorporating power and direction of the broadcast signal at its source, distance as well as interference (diffraction or reflection) due to topographic features such as mountains or hills.²⁶ The modelling used reflects the broadcast map as of December 2017 (ACMA 2018). The signal strength raster indicates 7 levels of signal strength, with a strength of 4 or above considered moderate-good reception (ACMA 2018). We identify Sky News signal based on tower callsigns licensed to WIN Television (ACMA 2012; ACMA 2017b). See appendix for details regarding assembly of WIN signal data.

Figure 1 illustrates access to Sky News, as determined by the transmission signal strength of all towers broadcasting Sky News on FTA TV across Australia. In Western Australia, Sky News access follows a unique pattern: while remote areas can access Sky News through free satellite TV (VAST), areas with good terrestrial TV reception are typically ineligible for VAST and therefore cannot access Sky News. This includes Perth and several regional areas that receive ABC transmissions but lack commercial TV transmitters.²⁷ Panel (c) of Figure 2 illustrates the signal strength raster for one specific area, the electoral division of Macarthur in New South Wales.

Polling place catchment data, published by the AEC (2019a), report the share of voters that cast their ballot at each polling place according to the Statistical Area Level 1 (SA1) in which they reside. AEC derive these data from electoral roll mark-off data. With an average population size of approximately 400 people, SA1 is generally the smallest unit for public

²⁶ Transmission is also affected by geographic and atmospheric factors such as soil conductivity.

²⁷ Reception for ABC would make a household ineligible for VAST. E.g., the unshaded area northeast of Perth reflects areas serviced by the signal from Broadcast Australia Site off Dalwallinu.

release of census data. The catchment of the Eagle Vale polling place in the electoral division of Macarthur is depicted in Panel (a) of Figure 2.

To measure the share of voters at each polling place exposed to Sky News on FTA, we intersect the signal strength raster with Microsoft's Global ML Building Footprints dataset (Microsoft, 2024). The Microsoft ML Building Footprints dataset provides precise geographic data on building locations. Developed by Microsoft using a deep neural network model trained on satellite imagery, this dataset delivers vectorized building footprints with high spatial accuracy.

To measure the share of voters at each polling place exposed to Sky News we take the weighted average exposure across the SA1's that make up the polling place footprint, where the weights are the share of voters living in each SA1.

$$SkyShare_i = \sum_{s \in i} PPVoteShare_{is} \times SkyShare_s^{SA1} \quad (1)$$

where $s \in i$ denotes the set of all SA1s in the catchment of polling place i ; $PPVoteShare_{is}$ is the share of voters at polling place i from SA1 s ; and, $SkyShare_s^{SA1}$ denotes the share of the population in SA1 s that are exposed to Sky News. To estimate $SkyShare_s^{SA1}$ we first calculate the share of building footprint area that overlaps with Sky News signal within each Mesh Block²⁸ and multiply by the 2016 Mesh Block population²⁹ then aggregate Mesh Block

²⁸ Mesh Block is the smallest geographic area defined by the ABS and is designed where possible to contain between 30 and 60 dwellings. There are 368,286 Mesh Blocks covering the whole of Australia without gaps or overlaps.

²⁹ The Microsoft ML Building Footprints dataset is the most comprehensive footprint data available at the time of writing. However, buildings were absent in the case of 2,224 Mesh Blocks which the census shows had small but non-zero population, therefore we find that coverage of the building footprints captures 99.4% of the Australian population. In these cases with missing data, we impute the population exposed to a given signal strength based on the area share of the Mesh Block multiplied by the 2016 population.

populations to Statistical Area Level 1 (SA1) and take the ratio of treated population to total population.³⁰

Measurement of the Sky News exposure by voters at each polling place is illustrated in Figure 2 for the electoral division of Macarthur. Panel (a) shows ED boundaries (dark line), SA1s (fine line), Mesh Blocks (very fine line), polling places (dots), and Eagle Vale polling place (cross). Panel (b) shows SA1s in Eagle Vale catchment. Panel (c) shows signal strength raster (shaded areas have good Sky News signal). Panel (d) shows Sky News exposure share for voters at PPs in Eagle Vale by SA1.

Our base dataset covers 7,826 polling places across 151 electoral divisions from the 2019 election. Since our identification strategy relies on variation within electoral divisions, it is notable that 110 electoral divisions show meaningful variation in Sky News coverage across their polling places.³¹ The resulting data for all variables for polling places in these electoral divisions are summarized in Table 1.

Although we have detailed broadcast signal data, small area TV ratings (viewership) data are not collected in Australia, so we cannot directly observe Sky News ratings at SA1, polling place or even electoral division level. However, available evidence confirms substantial viewership: 3.8 million people tuned in to Sky News via the WIN network in 2019 and Sky News ratings on free-to-air were comparable to those of ABC News in the week leading up to the 2019 election (see Section 2.c).

³⁰ There are 57,523 spatial SA1 regions covering the whole of Australia without gaps or overlaps.

³¹ We operationalize this as an electoral division having at least a five percentage point difference in free-to-air Sky News exposure between its highest and lowest exposed polling places. Using a more inclusive threshold of 1 percent difference does not materially change our estimated treatment effects. Full sample estimates are also provided in our robustness checks.

4. Empirical Approach

Our empirical strategy identifies the effect of access to Sky News, thereby exploiting plausibly exogenous variation in exposure attributable to signal strength and idiosyncratic licensing arrangements. This approach has the advantage of avoiding selection problems that would arise from using individual-level viewing decisions.

We estimate a two-way fixed effect (TWFE) dose response model in first differences given by:

$$\Delta Y_i = \beta_0 + \beta_1 SkyNewsShare_i + \omega_d + \varepsilon_i \quad (2)$$

where ΔY_i is the change in election outcome between 2016 and 2019 at polling place i . As discussed previously, we consider the effect of FTA Sky News LNP lead over ALP in first preference votes, as well as raw LNP and ALP first preference vote shares and estimated two-party preferred (TPP) result at each polling place. Our main explanatory variable of interest, i.e. the continuous treatment variable, is $SkyNewsShare_i$ which is the share of voters casting their ballot at polling place i who received FTA Sky News broadcast signal at their residence.

Since we are modeling the change in vote share, the average time-invariant *level* of each outcome variable is controlled for, as it is in standard difference-in-differences estimation. We also include electoral division fixed effects (denoted by ω_d) so that identification is based on variation in Sky News coverage between polling places *within* each of electoral division. Electoral division fixed effects capture the average effect of local candidates, including whether the incumbent is a member of the government or the opposition; local advertising; local electoral promises and other division-level factors like industry mix, population density and

composition.³² To account for polling places affected by redistributions, we include the full set of 2016-electoral-division \times 2019-electoral-division fixed effects.

Identification of treatment effect in a continuous treatment difference-in-differences setup differs from the binary treatment case and has been the subject of fast emerging literature (de Chaisemartin and D'Haultfoeuille, 2020, 2023, 2024; Callaway, Goodman-Bacon and Sant'Anna 2024; Roth, *et al.*, 2023; de Chaisemartin *et al.* 2024a). Stated informally, identification in the case of continuous treatment does not rely purely on a control group purely comprising untreated individuals, but also a comparison between individuals with varying levels of treatment. In our context, the control group for observations with a specific level of exposure to Sky News are not restricted to untreated observations, but rather consist of all other observations with a different level of treatment. Callaway, Goodman-Bacon and Sant'Anna (2024) show that in the case of continuous treatment the treatment effect (in this case the Average Causal Response) is identified under the assumption that there is no selection into the specific dose received, which they call the strong parallel trends assumption. This assumption breaks down in situations where individuals select their own level of treatment based on their expected personal response (such as the number of painkillers taken to treat a headache).

de Chaisemartin and D'Haultfoeuille (2024) show that the strong parallel trends assumption articulated by Callaway, Goodman-Bacon and Sant'Anna (2024) is equivalent to a homogeneous slope assumption under a less onerous placebo testable parallel trends assumption. The specific form of parallel trends assumption with a non-binary treatment is that there is a real number such that:

³² While difference-in-differences does not require balance, the idiosyncratic mosaic of reception across outer suburban and rural areas which resulted from the syndication of Sky News to regional broadcaster WIN provides a more plausible context for identification than comparison with the inner-city electorates which have almost no Sky News reception. Correspondingly, the pre-treatment parallel trends test shows systematic divergence in the absence of electoral division fixed effects.

$$E[\Delta Y(0)|D_2] = \mu_0 \tag{3}$$

where D_2 is the period 2 treatment dose and $\Delta Y(0)$ is the counterfactual change in Y under zero treatment. Equation (3) states that that counterfactual untreated trend is not systematically related to the level of treatment received. In other words, if no treatment had been given, those who received strong treatment would not have evolved in a systematically different way from those who received weak treatment. They note this condition can be readily placebo-tested based on a regression of pre-treatment trends on the not-yet-received individual specific dose (which is entirely analogous to pre-treatment test for parallel trends in regular binary treatment difference in differences). de Chaisemartin and D'Haultfoeuille (2024) propose a non-parametric linearity test to validate the assumption of homogeneous slope based on Stute (1997). In our analysis below, we report both pre-treatment placebo test of the parallel trends test as well as the Stute test to support the validity of our identification. Moreover, we argue that the *a priori* case for the assumption in this case is sound because treatment (Sky News FTA access) exists as a binary condition at the individual voter level, we measure this as a continuous variable as an artifact of estimating voting outcomes aggregated to the polling place.

5. Results and Discussion

a. Main results

Our main outcome variable is the LNP's lead over the ALP as a percentage of total first preference votes. This metric captures relative party preferences while accounting for potential asymmetric shifts in voter support to independent candidates or minor parties. Given Sky News' partisan conservative stance, if the channel indeed affects voting behavior, we expect to see an increased LNP (conservative) margin in first preferences at polling places where a greater share of voters is exposed to Sky News. We report the treatment effect on constituent components of

the first preference margin: the LNP (nominally right) and ALP (nominally left) first preference vote shares. Additionally, we report the treatment effect on estimated two-party preferred (TPP) outcome. The TPP is the share of votes for LNP candidate after the distribution of vote preferences from voters that who ranked 3rd party and independent candidates above either the ALP or LNP.

Table 2 presents our main results: estimates of the Sky News share coefficient from Equation 1 for each of our four dependent variables. Column 1 shows our baseline two-way fixed effects (TWFE) dose-response design, estimated using first differences with electoral division fixed effects. These electoral division fixed effects control for division-specific factors such as candidate quality, incumbency status, political advertising by all parties, local issues, and electoral commitments targeted at specific seats.

The estimates indicate that increased Sky News exposure raised the LNP's electoral margin by 1.485 percentage points (Column 1). This is consistent with a significant decrease of 0.755 percentage points in the ALP vote share and an increase of 0.733 percentage points in the LNP vote share, as shown in columns 3 and 4, respectively. Column 2 shows the estimated effect on the LNP's two-party preferred (TPP) vote share is an increase of 0.649 percentage points. This is quite consistent with the estimated treatment effect on the total LNP electoral margin, despite the limitations of measuring TPP at the polling place level (discussed in Section 3).³³ There are several reasons why changes in first preferences may not fully reflect the changes in two party preferred votes. Allocation of preferences can give rise to discontinuities in TPP; e.g., evenly split three-way races can translate to a landslide result if second preferences on ballots for the eliminated candidate fall disproportionately to one of the two remaining

³³ Noting that a 1 percentage point shift in TPP (which is a share of total votes) is equivalent to a 2 percentage point increase in the LNP's TPP lead.

candidates. Second, as noted, some noise is introduced estimating TPP at the polling place level where the order of candidates eliminated may differ from the electoral division.

b. Parallel Trends and Identification

As discussed in section 4, recent advances in continuous treatment difference-in-differences, design show that identification requires that counterfactual untreated outcome trends are not systematically related to treatment intensity. de Chaisemartin and D'Haultfœuille (2024) show that this condition is equivalent to both (1) homogeneous slope assumption and (2) a parallel trends assumption. We have argued previously that the *a priori* case for the assumption in this case is sound and statistical tests of (1) and (2) suggested by de Chaisemartin and D'Haultfœuille (2024) support this case. We conduct the non-parametric linearity test based on Stute (1997), with the results presented in the penultimate row of Table 2, with the main results. For our main dependent variables LNP lead in first preference votes and TPP, we fail to reject the null hypothesis with p-values of 18% and 66%, respectively, supporting the assumption of homogeneous treatment effects. The null is rejected for ALP, one of the components of LNP lead. This may be due to the uneven distribution of observations across treatment intensities. Given that LNP Lead and TPP—which are the primary focus of our analysis—and LNP pass the test, we interpret the results as a whole as supporting the validity of our identification strategy.³⁴

In Table 3 we present the suggested parallel trends in the pre-analysis period. Here, the dependent variable relates to the change in electoral outcome at each polling place between the 2013 and 2016 elections. The 2016 election is a strong candidate for consideration of testing parallel trends because, as was the case in the 2019 election, the LNP were incumbent, and the

³⁴ de Chaisemartin *et al.* (2024b) also consider a test based on Yatchew (1997) observing it to be somewhat less powerful. We also calculated these and they are entirely consistent with the Stute test results reported.

government did not change. The explanatory variable of interest is the hypothetical share of the catchment of each 2016 polling station that would have had access to Sky News had Sky been broadcast at the time (it was not syndicated to FTA broadcast until 2018). The coefficients are all statistically insignificant and much lower in magnitude than our baseline estimates, with both TPP and ALP reflecting the opposite sign to the 2019 election; suggesting that no divergence in trends in vote swing was observable prior to the introduction of Sky News.

c. Robustness checks

Robustness checks for the results pertaining to LNP lead, ALP, LNP and TPP are presented in Table 4. We first consider addressing factors that give rise to patterns of heteroskedasticity in the vote outcome data, including spatial correlation and variation in the number of votes at each polling place. Examination of residuals suggests that the variance of the error term is larger for smaller polling places (Appendix Figure A1). In column (1) we present estimates with the largest possible sample (no data cleaning) therefore include both electoral divisions with negligible variation in Sky News as well as polling places recording fewer than 100 votes. We expect these to produce a smaller estimate owing to the inclusion of stayers and quasi-stayers, and this is marginally so, but the closeness of this result highlights that our result is robust to sample selection.

Also in consideration of heteroskedasticity, in column (2) we use weighted least squares where the weights are designed by following the approach proposed by Solon, Haider and Wooldridge (2015) to achieve precise estimates by correcting for heteroskedasticity. Considering spatial correlation, in column (3) we report estimates from a spatial correlation model based on Colella *et al.* (2019), with the distance threshold set at 10km.³⁵

³⁵ We considered alternative distances and results were materially unchanged.

In column (4) we add a control for estimated hypothetical open space signal strength which reflects an estimate of the (hypothetical) signal strength in the absence of any geographic or topographic features such as mountains. Olken (2009) and Wang (2021) argue that controlling for open space signal implies that identification comes from the residual variation in signal strength that reflects the idiosyncratic topographic factors along the signal transmission pathway. Details pertaining to the calculations of open space signal strength are reported in Appendix C. The coefficient estimate reported in row one, the treatment effect on the electoral margin in first preference vote, suggests Sky News reception over the period leading up to the election is associated with 2.048 percentage points increase in the electoral lead of the conservative LNP over the ALP. Row 2 to 4 present estimates of the effect of Sky News FTA broadcast on the LNP (1.048), ALP (-1.00) and TPP (0.724), respectively. Although, whether the addition of such a control strengthens the identification strategy or not is debatable, it is reassuring to see that it does not meaningfully impact our results and, if anything, makes them stronger.

In columns 5-7 we consider variations in how we measure Sky News exposure. In column (5) we measure Sky News exposure by instead assuming that the population within a Mesh Block is equally distributed across the entire area of a Mesh Block rather than the building footprint (Section 3 for details on the construction of our Share of Sky coverage variable). In column (6), we consider an alternative definition of Sky News reception in which we extend treatment to include signal strength of 3 (described as ‘variable’ compared to 4 ‘good’, which was used in the baseline). We expect this variation to weaken the effect of Sky News exposure since some households counted as having access to Sky News FTA will, in practice, have no reception. This is indeed what we see, though coefficients have similar albeit somewhat smaller magnitude and are still significant at the 10 percent level.

In column (7) we convert our continuous treatment variable (percentage of voters exposed to Sky News) to a binary treatment variable, which is 1 if more than 50% voters at a polling place are exposed to Sky News, and 0 otherwise. Although, this is expected to weaken the coefficient estimates, we offer this as an additional informal way to triangulate difficulties arising from the estimation of TWFE models with a continuous treatment variable, specifically illustrating that the estimated effect does not overtly reflect comparisons between level of treatment (and complements the Stute tests reported previously).

d. Informal votes

We have argued previously that Australia's electoral system provides an optimal setting for examining the effect of partisan news on vote choice, primarily due to its compulsory voting laws and extensive measures to facilitate voting access. These features result in consistently high voter turnout, exceeding 92 percent, minimizing concerns about partisan news influencing electoral outcomes by disproportionately mobilizing voters of one party over another. Given this context of high turnout, we extend our analysis to examine whether Sky News exposure affected another potential avenue of voter behavior: the rate of informal votes. Informal votes are ballots that fail to meet the AEC's criteria for validity, including incomplete ballots. Results presented in Table 5 show that access to Sky News (Sky News Share) has no statistically significant effect on informal vote rates. This finding suggests that exposure to Sky News does not appear to impact voters' likelihood of casting invalid ballots, whether inadvertently or as a form of protest.

e. Treatment Effect Heterogeneity

We believe that the potential treatment effect heterogeneity attributable to demographic factors is likely to be limited because pre-existing conservative partisan alignment is a strong predictor of consumption of partisan news. In other words, demographic attributes that are positively

correlated with viewership are likely negatively correlated with amenability to change (or visa-versa). Like the proverbial choir, those more likely to watch Sky News may also be least likely to change their political persuasion as a result. Nonetheless we collated all available demographic data to assess possible treatment effect heterogeneity.

Demographic attributes can never be directly linked to ballots in secret ballot process, so data do not exist to estimate separate models for various demographic sub-populations.³⁶ As a second-best alternative, we estimate set of models augmented with treatment intensity interacted with the age and gender composition of electors (AEC 2019) and estimated division demographic characteristics provided by the ABS (2019) which are available at the electoral division level. We report results, cautiously noting that demographic measures, even in aggregated level, have a number of inherent limitations. First, demographic information collected by the Australian census of population and housing has a number of intrinsic limitations, including the fact that the Census captures all people, including those who are not eligible to vote (e.g., non-citizens such as international students). A second limitation of both AEC and ABS data is that some demographics are expected to vote disproportionately by mail or at special voting stations such as prisons or hospitals which are excluded from our analysis.³⁷ Notwithstanding the limitations of estimating polling place demographics, we estimated separate models for our primary dependent variable, augmented Sky News interacted with population average shares that are: college educated; female, and aged between 19 and 29 and above 65, respectively. Results are provided Appendix Table A1. No evidence of heterogeneous treatment effect with respect to age, education or gender is observed.

³⁶ In an analogous continuous treatment difference-in-differences design looking at gender pay gap, Bailet *et al.* (2024) estimate separate models for sub populations.

³⁷ E.g., prisoners servicing a sentence fewer than three years are eligible to vote in Australian elections by mail or via with special mobile voting teams. An analogous issue arises with electors in health care (both aged care and hospitals) who are more likely to vote via mail or special hospital polling teams.

f. Simulations: The Impact on the 2019 Election

Our primary goal is to establish the causal effect of partisan news media on voter behavior, we also simulate its impact on the 2019 election outcome. We simulate electoral results under two counterfactuals: one with no Sky News broadcast on free-to-air television, and another with Sky News available to all Australian households. We predict Electoral Division outcomes by applying our TPP coefficient estimate (Table 2, column 2) under scenarios where Sky News exposure is set to zero or one. Using the point estimate, we find that two electoral divisions would have flipped. Under the counterfactual scenario of no Sky News exposure, the ALP instead of the LNP would have won the electoral division of Bass. Under complete Sky News coverage, the LNP would have won Macquarie which the ALP won in the 2019 election.

6. Conclusion

Australia is one of the world's most enduring parliamentary democracies, with a range of institutional features that result in one of the highest rates of voter turnout in the world. These characteristics, including compulsory voting and uniform voter registration, provide a unique opportunity to examine the influence of partisan news on voter behavior, largely unconfounded by variations in turnout. Our findings offer insights into the limits of administrative and procedural safeguards against media influence in democratic systems, while shedding light on the mechanisms through which partisan media affects political preferences.

Our study benefits from comprehensive uniform national data, encompassing every state, electoral division, and polling station, providing a much more finely grained geographical perspective than previous studies. We combine detailed data on the geographic footprint of voters at each polling station across Australia with information about their exposure to Sky

News based on broadcast signal data at a resolution of just 60-80 household and measured using the detailed data on building locations.

Based on this newly assembled data, we employ a two-way fixed effect (TWFE) dose response design, also known as a continuous treatment difference-in-differences approach. Our model incorporates electoral division fixed effects to account for factors such as candidate quality and incumbency. This approach ensures that our treatment effect is identified based on within-electoral-division. Our implementation reflects recent developments in the fast-emerging literature on identification of treatment effects in continuous treatment difference-in-differences setups, including a non-parametric test on the pre-treatment period to substantiate the assumption that treatment effects are mean-independent of dose.

We find that Sky News broadcast leads to a 1.5 percentage point increase in the electoral lead of the conservative Liberal National Party (LNP) over the center-left Australian Labor Party (ALP). This effect appears to stem from both an increase in LNP support and a decrease in ALP support. The result is confirmed for two-party-preferred vote share, which reflects preferences distributed via ranked choice voting. These findings are robust to variations in sample selection and methods addressing spatial heteroskedasticity and polling place size. We find no observable effect of Sky News exposure on the rate of informal votes. Simulations based on our estimated causal effect indicate that Sky News exposure may have changed the outcome in one electorate, with the potential to affect two electorates under full saturation. Although it would have come close, it would not have changed the final parliamentary majority in this instance. Nonetheless the result suggests partisan media has an electorally important impact even in a context with extensive institutional safeguards in place.

Past studies have emphasized the benefit of exposure to cross-cutting news media (e.g., exposure of Fox News viewers to CNN), our results suggest a more concerning possibility. A

partisan news media that merely reinforces and amplifies existing beliefs is likely to contribute to polarization (bimodality). However, our findings indicate that partisan news can influence not only those already leaning towards its ideological stance but also a broader segment of the population. This suggests a more pervasive impact: partisan news may have the capacity to gradually shift the political outlook of the entire population over time, rather than simply reinforcing existing views or exacerbating polarization.

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8. Data Appendix

a. Polling Place Data

For the primary results, we use 2019 federal election data for the House of representatives at the polling place-level via the AEC Tally Room repository (AEC, 2019c). This includes data on Two party preferred by polling place as well as the series of First preferences by candidate by polling place for the 8 states and territories. We merge the election results with polling place location metadata from the AEC Tally Room. 547 Polling places with no votes recorded, mobile voting and polling places located in hospitals and prisons as indicated within the metadata are removed. The latter are removed due to the substantial variation in the covered populations between elections.

The primary data of interest contains both the polling place ID and various swing variables comparing the 2019 outcomes and the 2016 federal election and are the basis for the first differenced transformations in our difference-in-differences estimate (i.e., Equation 1). Polling stations are typically schools or government administrative buildings. The AEC measures are adjusted for any change in location using population weights based on the address of the voters on the electoral roll who vote at each polling place.

As described in the paper, some electoral boundaries were subject to minor redistributions, that is the boundary of an electoral division can move so that a specific polling place is shifted to a new electoral division. This does not directly impact the measure of swing. Moreover, all regressions include a full set of 2016-electoral-division x 2019-electoral-division fixed effects such that any re-distributed sub-geography has its own fixed effect. For polling places that are new to 2019, 2016 electoral divisions are identified based on the electoral division of SA1s of the residential location of the voters casting their ballots there (i.e., the 2016 SA1 footprint).

From the 8,192 polling places with non-zero votes recorded, we further cleaned as follows. In 91 cases, polling outcomes in 2019 could not be reliably compared with results in 2016; either because one or the other party were not represented in one of either 2016 or 2019 (29 cases, in these cases raw AEC data typically report swing equal to the vote-share) or because the polling place was new in 2019 and the footprint included more than one 2016 electoral division so that we could not assign 2016-electoral-division x 2019-electoral-division fixed effects (62 observations). Of the remaining 8,101 polling places reporting vote swing between 2016 and 2019, 1,710 are in electoral divisions with no within variation in Sky News Share and a further 772 have less than 5 percent variation between the polling place with the most exposure and the polling place with the least exposure. 319 are excluded as they have fewer than 100 votes. Leaving us with results data for a maximum of 5,300 polling places.

Polling place catchment data, published by the Australian Electoral Commission (AEC 2019a), report the share of voters that cast their ballot at each polling place according to the Statistical Area Level 1 (SA1) in which they reside. AEC derive these data from electoral roll mark-off data. With an average population size of approximately 400 people, SA1 is generally the smallest unit for public release of census data. This data is used to construct our primary treatment variable, Sky News Share which is described in detail within the main text. In addition, we use the polling place catchment data aggregated at SA1 to construct voter-weighted centroids for each polling place that are used to generate the spatial weights for our Spatial Correlation models in the Robustness Checks. Specifically, for each polling place, we calculate its centroid by taking a weighted average of the SA1 centroids within its catchment area, where each SA1 centroid is weighted by its number of voters.

b. WIN – Sky News Signal Data

Signal propagation data come directly from the Australian Communications and Media Authority (ACMA 2017a). We identify which towers broadcast WIN, and therefore Sky News, based on the callsigns licensed to WIN Television using ACMA records of listed broadcasters by region and State (ACMA 2012). These data were linked to Digital TV Planning data (ACMA 2017b) and in turn to the geocoded tower locations attached to the broadcast signal raster files (ACMA 2017a). The list of WIN callsigns is provided in table A1.

CALLSIGN	Service_Area_Licensee_Call Sign
WIN	Southern New South Wales TV1 WIN Television Nsw Pty Ltd WIN
AMN	Griffith And Mia TV1 WIN Television Griffith Pty Ltd Amn
MDN	Griffith And Mia TV1 WIN Television Griffith Pty Ltd Mdn
MTN	Griffith And Mia TV1 WIN Television Griffith Pty Ltd Mtn
RTQ	Regional Queensland TV1 WIN Television Qld Pty Ltd Rtq
SDS	Mount Gambier/South East TV1 WIN Television Sa Pty Ltd Sds
LRS	Riverland TV1 WIN Television Sa Pty Ltd Lrs
RDS	Riverland TV1 WIN Television Sa Pty Ltd Rds
RTS	Riverland TV1 WIN Television Sa Pty Ltd Rts
MGS	Mount Gambier/South East TV1 WIN Television Sa Pty Ltd Mgs
SES	Mount Gambier/South East TV1 WIN Television Sa Pty Ltd Ses
TVT	Tasmania TV1 WIN Television Tas Pty Ltd TVt
STV	Mildura/Sunraysia TV1 WIN Television Mildura Pty Ltd Stv
VTV	Regional Victoria TV1 WIN Television Vic Pty Ltd Vtv
WOW	Remote And Regional WA TV1 WIN Television Wa Pty Ltd Wow Various
NRN	Northern Rivers Television Pty Ltd*

Notes: NRN is not listed as licensed to WIN in ACMA 2012; NRN was purchased by WIN in May 2017.

Tower locations in callsign data (ACMA 2017) were matched based on string with tower broadcast signal data (MySwitch 2018). In doing so, we treated tower entries with same

GPS coordinates as the same and remove “town / HP”. Towers with broadcast data but no callsign data were dropped as these were found to be radio towers. We manually checked over 100 locations across regional and metropolitan Australia web search, mySwitch and personal communication with antenna repair professionals (Matrville, Sydney) and caravan parks in various locations.

c. Open Space Signal Strength

We use transmitter direction and power output from ACMA (2017) which provides the effective radiated power in Watts using an azimuth system with 1-degree increments. We then convert the power output P for azimuth i for every tower t to dBm using the following formula:

$$x_i^t = 10 \cdot \log_{10} P_i^t \cdot 1000$$

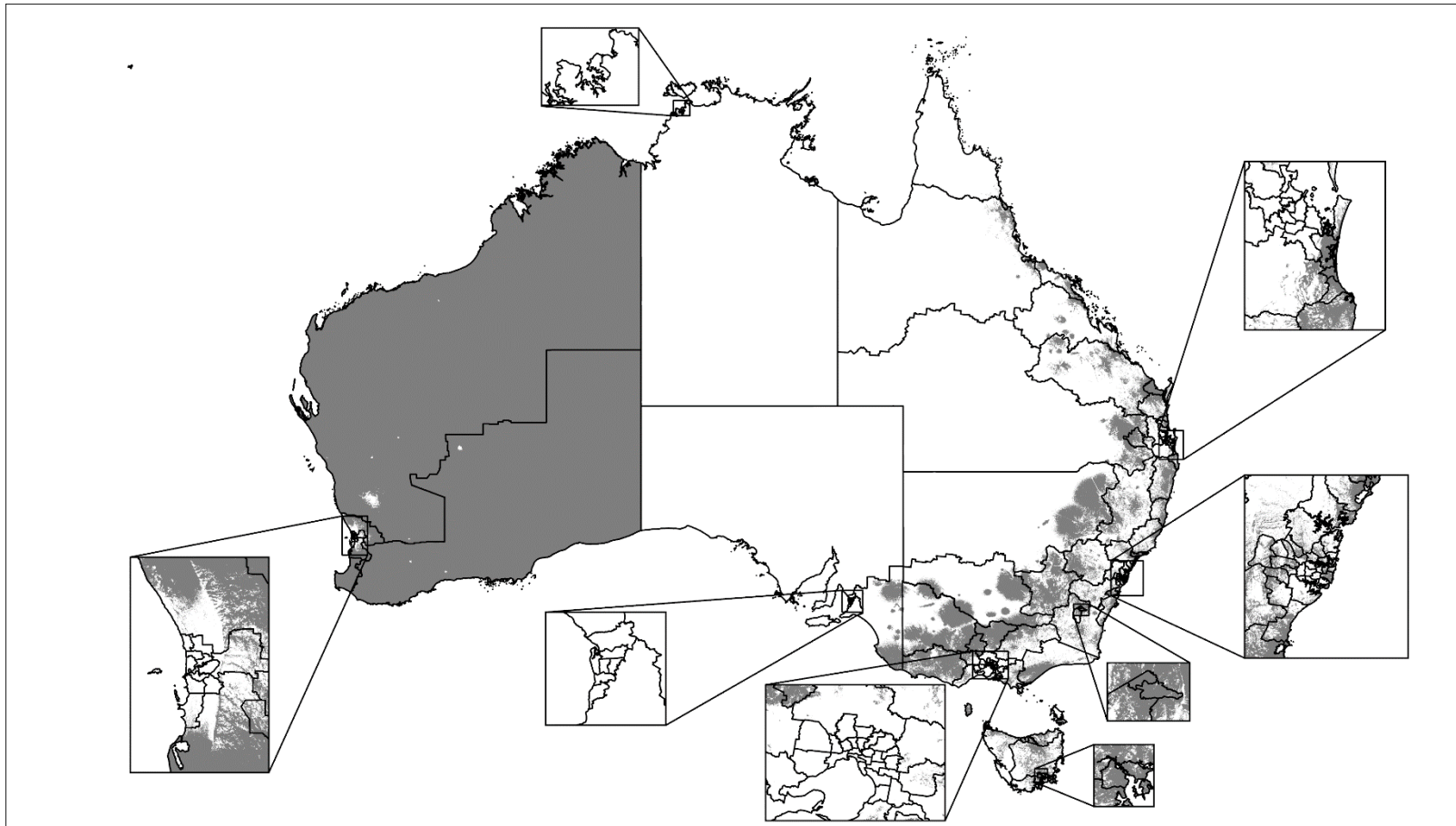
For each SA1 and tower combination, we calculate the azimuth orientation to the tower (ie. if the tower was the middle of a compass, the polling place would be the degrees away from true North). We can then calculate the power output in dBm that the station would output to a centroid of the SA1 in free space, x^r that is in the i^{th} azimuth to tower t using the following formula:

$$x^r = x_i^t - 21.98 + 20 \cdot \log_{10} \frac{300000}{0.191} - 20 \cdot \log_{10} DistKM_{rt} \cdot 1000$$

Where 300,000 represents is the speed of light in km/s, and 0.191 is a typical frequency of Nine Network signals in GHZ and $DistKM_{rt}$ is the distance to SA1 r to tower t in kilometers. For each SA1, we select the tower with the strongest signal strength. We then calculate the weighted average signal strength for each polling place based on their distribution of registered voters in SA1.

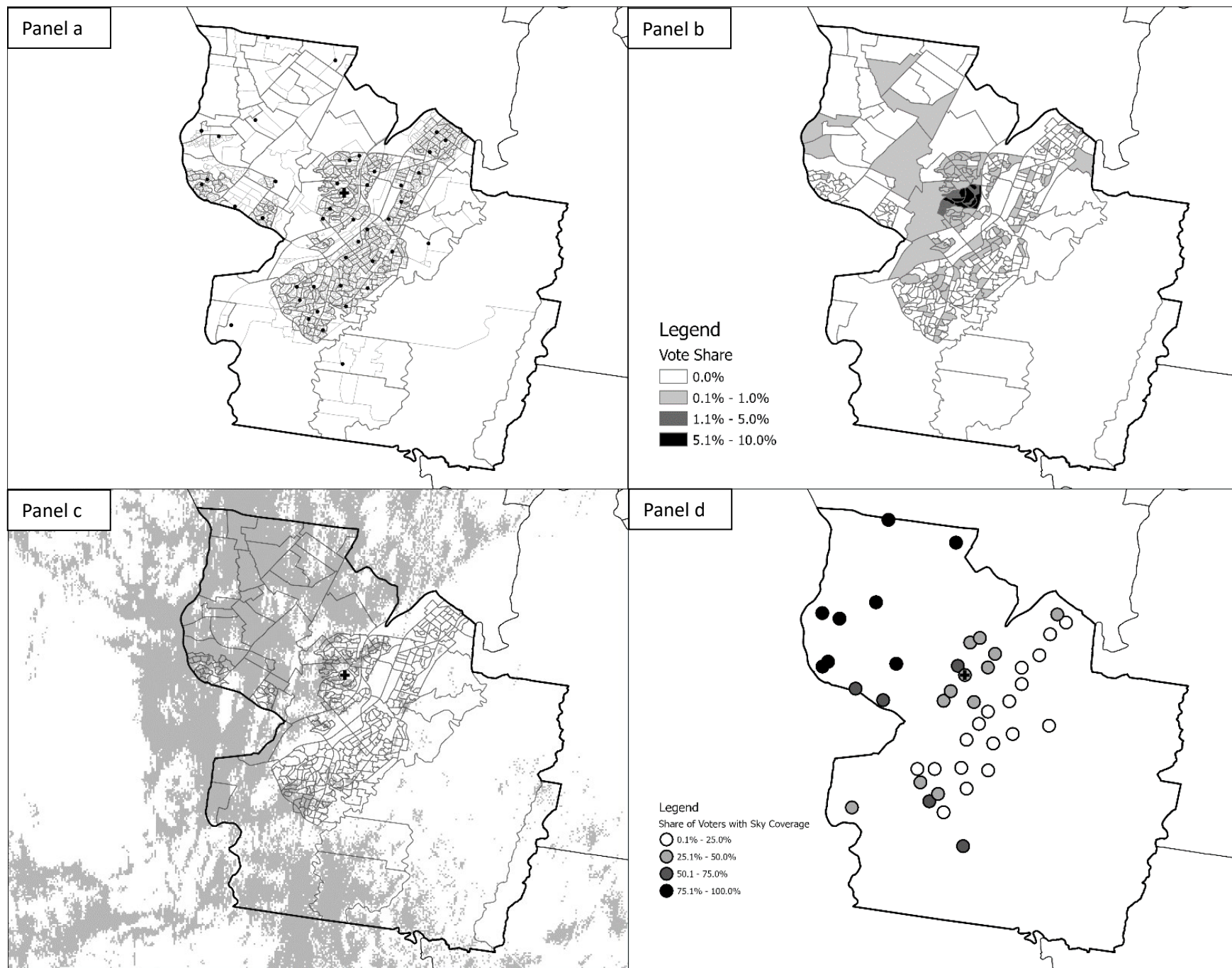
Figures and Tables.

Figure 1. Australian Electoral Divisions and Sky News Reception.



Notes. Tower broadcast data and electoral district boundaries were sourced from ACMA (2017a) and AEC (2019c), respectively. Details on the construction of Sky News Reception can be found in Section 3. Insets show all 8 State and territory capitals.

Figure 2. Measuring Sky News Exposure at each Polling Place: Example of Eagle Vale Polling Place in the Electoral Division of Macarthur.



Electoral Division of Macarthur. **Panel (a)** All relevant geography: ED boundaries (dark line); SA1 (fine line); Meshblock (very fine line); 32 polling places within the ED (dots); 'Eagle Vale' PP (cross +). **Panel (b)** SA1's which make up the catchment of Eagle Vale PP. **Panel (c)** signal strength raster, (shaded area indicates good Sky News signal). **Panel (d)** Sky News exposure share for voters at PP in Macarthur; Eagle Vale indicated by cross +.

Sky News exposure is the weighted average Sky News exposure share across the SA1's which make up the catchment of each polling place. Weights are calculated using the proportion of total **building footprints** in each SA1 that receives good Sky News FTA signal coverage. Source: see section 3.

Table 1. Regression sample summary statistics

	count	mean	sd
Change in LNP lead over ALP (percentage points)	5,295	1.04	10.84
Change in first preference ALP vote share 2016-19	5,300	-2.01	5.96
Change in first preference LNP vote share 2016-19	5,295	-0.97	8.62
Change in Two Party Preferred LNP vote share	4,549	1.66	5.61
Share Sky News	5,300	0.61	0.39
Sky100percent	5,300	0.16	0.37
Sky0percent	5,300	0.10	0.30
Open Space Signal Strength	5,300	89.27	6.03
Total Votes in 2019	5,300	1470.17	2122.39

Notes: Each observation represents a polling station. Vote shares are expressed as percentages. Sky100percent and Sky0percent are indicator variables for polling booths with complete or no Sky News coverage, respectively. Signal strength is measured in dBm. The smaller sample for Two Party Preferred reflects the set of polling places which had both a Labor and Coalition candidate.

Table 2. Dependent variable: Change between 2016 and 2019 Election

	(1) LNP FP Lead	(2) TPP	(3) ALP	(4) LNP
Share Sky News	1.485*** (0.519)	0.649** (0.328)	-0.755*** (0.286)	0.733** (0.330)
Stute test	0.176	0.664	0.002	0.556
Observations	5,295	4,549	5,300	5,295

Notes: Each column represents a separate regression. The dependent variable in each regression is the change in the respective vote share between 2016 and 2019, measured in percentage points. Share Sky News ranges from 0 to 1. The Stute test examines whether the relationship between the dependent variable (Y) and Share Sky News (D) is linear by comparing the test statistic S (computed from cumulative sums of sorted residuals) with its bootstrapped distribution under the null hypothesis of linearity. All regressions include the full set of 2016-electoral-division and 2019-electoral-division fixed effects. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3. Parallel Trends: Dependent variable: Change between 2013 and 2016 Election

	(1) LNP FP Lead	(2) TPP	(3) ALP	(4) LNP
Share Sky News	0.389 (0.481)	-0.337 (0.310)	0.0492 (0.263)	0.438 (0.325)
Observations	4880	4148	4880	4880

Notes: Each column represents a separate regression. The dependent variable in each regression is the change in the respective vote share between 2013 and 2016, measured in percentage points. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4. Robustness Checks

	(1) All available Polling Places	(2) Weighted Least Squares	(3) Spatial Correlation Model	(4) Controlling for OSSS	(5) Area Weighted Sky Share	(6) Sky3to6	(7) Discretized
LNP FP Lead	1.436*** (0.536)	1.338*** (0.493)	1.485** (0.599)	2.048*** (0.539)	1.606*** (0.522)	1.144* (0.584)	0.898** (0.350)
TPP	0.589* (0.335)	0.637** (0.310)	0.649* (0.381)	0.724** (0.324)	0.712** (0.331)	0.719* (0.380)	0.415* (0.213)
ALP	-0.562** (0.284)	-0.636** (0.273)	-0.755** (0.339)	-1.000*** (0.291)	-0.815*** (0.289)	-0.428 (0.330)	-0.495*** (0.187)
LNP	0.876** (0.354)	0.710** (0.306)	0.733** (0.370)	1.048*** (0.345)	0.794** (0.333)	0.717** (0.359)	0.404* (0.225)

Notes. Each table cell represents a separate regression featuring the coefficient estimate and standard error for the Share of Sky News. (1) Including tiny polling places and Electoral Divisions with stayers and quasi-stayers. (2) Weighted least squares approach applied, following Solon, Haider, and Wooldridge (2015) to correct for heteroskedasticity. (3) Spatial correlation model using a 10km distance threshold based on Colella et al. (2019). (4) Control added for hypothetical open space signal strength to isolate topographic influences, per Olken (2009) and Wang (2021). (5) Sky News exposure measured by land area of polling place footprint rather than structures. (6) Broader definition of Sky News reception includes 'variable' signal strength (3 vs. baseline 4), weakening effect size but remaining significant at 10 percent. (7) Continuous treatment variable converted to binary (1 if >50% voters exposed, 0 otherwise). All models control for 2016x2019 electoral division fixed effects. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5. Sky News Share and Informal Votes

	(1) 2016-19	(2) 2013-16 (Parallel trends)
Sky News Share	-0.0388 (0.121)	0.0385 (0.127)
Observations	5,300	4,880

Notes. Each column represents a separate regression. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure A1. Heteroskedasticity - Residuals and polling place size

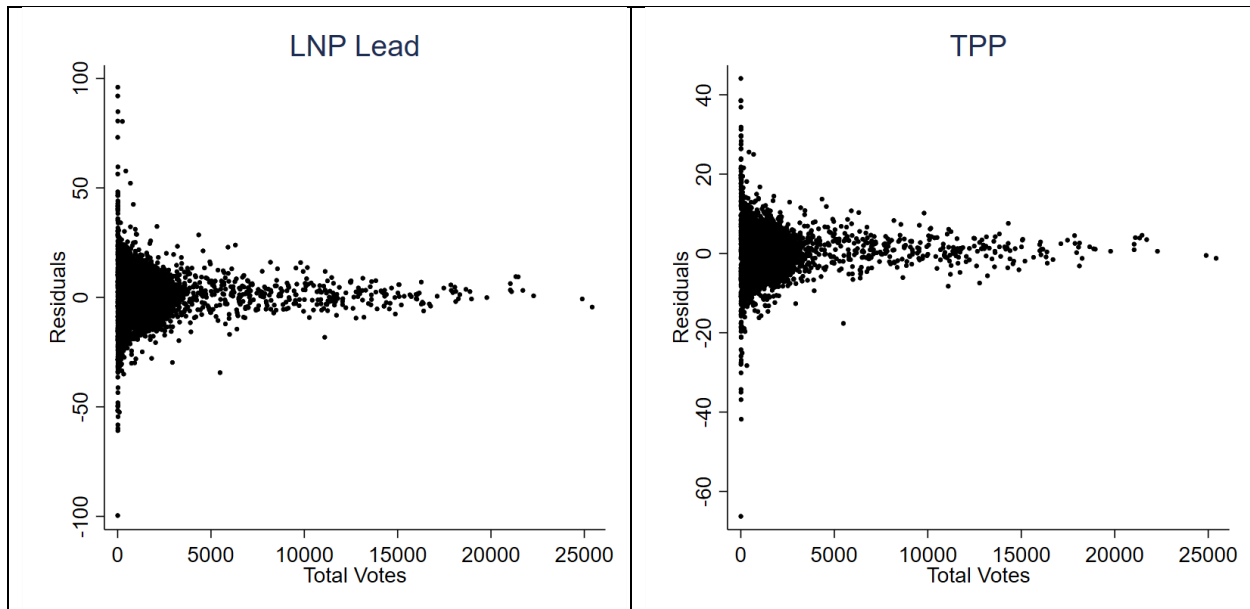


Table A1: Treatment Effect Heterogeneity Analysis.

Dependent Variable	(1) LNP FP Lead	(2) TPP	(3) ALP	(4) LNP
Age 65plus (share)	0.147 (0.364)	-0.140 (0.219)	0.0288 (0.229)	0.177 (0.188)
Age 18-29	0.0360 (0.507)	-0.191 (0.317)	-0.182 (0.302)	-0.145 (0.295)
Female	0.262 (0.625)	0.138 (0.360)	-0.319 (0.376)	-0.0577 (0.354)
Median income	-0.00235 (0.00421)	-0.000398 (0.00253)	0.00520** (0.00255)	0.00285 (0.00227)
Education Cert III +	11.84 (14.11)	-5.189 (8.701)	-20.74** (8.207)	-8.886 (8.351)
Observations	5,295	4,549	5,300	5,295

Notes. Each table cell represents a separate regression featuring the coefficient estimate and standard error for the Share of Sky News. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$