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Does Protest Influence Political Speech? Evidence from UK Climate Protest, 2017–2019

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Abstract

How does protest affect political speech? Protest is an important form of political claim-making, yet our understanding of its influence on how individual legislators communicate remains limited. Our paper thus extends a theoretical framework on protests as information about voter preferences, and evaluates it using crowd-sourced protest data from the 2017–2019 Fridays for Future protests in the UK. We combine these data with ~2.4m tweets from 553 legislators over this period and text data from ~150k parliamentary speech records. We find that local protests prompted MPs to speak more about the climate, but only online. These results demonstrate that protest can shape the timing and substance of political communication by individual elected representatives. They also highlight an important difference between legislators' offline and online speech, suggesting that more work is needed to understand how political strategies differ across these arenas.

Keywords: representation; political communication; protest; climate change; Twitter

Does protest affect political speech? Existing research shows that protest can affect public opinion (Enos, Kaufman, and Sands 2019), voting behaviour (Madestam et al. 2013), media reporting (Wasow 2020), legislative outcomes (Agnone 2007), and legislators' issue attention (Walgrave and Vliegenthart 2012). But scholars have paid less attention to protest's effects on political speech, particularly at the level of individual legislators. This matters because legislative speech is one of the core means by which elected representatives provide democratic representation and responsiveness (Fernandes, Debus, and Bäck 2021). Such 'rhetorical' responsiveness is potentially easier to achieve and less consequential than meaningful policy change, but may nonetheless be a precursor to such change by placing new issues on the political agenda (Bevan and Jennings 2014).

This paper studies the effect of a wave of climate protests on legislators' political communication. Following Greta Thunberg's individual protest sit-in, a wave of protests and 'school strikes' occurred worldwide aimed at forcing legislative action on key climate change targets. The protests, which regularly took place on Fridays, became known as the Fridays for Future (FFF) movement. We take the UK over the period 2017 to 2019, a period that coincides with the height of this climate movement, as our case study. We view these climate protests in the UK as a most-likely case for identifying protest's influence on political speech and expect members of parliament (MPs) to place greater emphasis on the climate after FFF protests take place in their constituency.

To elaborate our hypotheses, we build on existing work that conceptualizes protest as affecting the distribution of information in society (Lohmann 1993). Engaging in protest is individually costly, but collective action can signal the breadth and depth of support for a political idea; protests can act as an informative cue about voter priorities. Legislators are nonetheless constrained in what they can say, when, and to whom – and this differs between online and offline platforms. As a result, we predict that protest will have a larger effect on online speech than offline speech.

The article uses large open-access parliamentary speech records, a full historical archive of MPs' online communication, and crowd-sourced event data to construct a new dataset of climate protests and legislators' communication at the MP-day level for the 2017–2019 UK parliament. This exceptionally fine-grained dataset allows us to match the location and timing of protests to individual MPs' behaviour, both in parliament and on Twitter. This enables us to investigate the relationship between constituency-level protest and MP-level speech with more precision than is usual in studies of this kind. Using dictionary-based and word-embedding techniques, we first demonstrate a marked increase in climate-related speech among all MPs in this period and a semantic shift toward language of greater urgency. We then use regression models to estimate the effect of climate protest on the timing of individual MPs' online and offline speech about climate change.

Our main analysis finds a small positive effect of climate protests on the timing of climate-related posts on Twitter ('tweets'). MPs in constituencies with climate protests were marginally more likely to tweet about climate change immediately after the protests than those in constituencies without climate protests. These patterns hold after controlling for unobserved heterogeneity at the MP- or constituency-level, and over-time variation in climate protest and climate tweets, through the use of fixed effects. Unexpectedly, however, we do not find an equivalent effect of protest on offline speech, despite exploring a range of alternative specifications and supplementary analyses.

Our findings have substantive and methodological implications for research on protest and political speech. First, we show that protest can substantively affect individual legislators' (online) communication, indicating one channel of influence for policy demands, which has been difficult to identify in previous work that relied on more aggregated measures. Second, we find a clear difference between MPs' online and offline political communication. While protest influenced the online speech of political elites, it left little trace in their offline speech. This raises interesting questions about MPs' use of these different communication tools, and points to the value of studying them both jointly. Considering either method of communication separately may under- or over-represent MPs' issue attention and responsiveness.

Protest and Responsiveness

Whether political elites are responsive to the issue priorities of their electorate is a core question in political science and public opinion research (Barberá et al. 2019; Wlezien and Soroka 2007). Research on protest has explored how legislators respond to the mobilization of activist publics (Amenta et al. 2010). A common underlying theme of this work is that policymakers should respond to protests because they provide information about public dissatisfaction with a social problem (Lohmann 1993). Following this argument, scholars have explored the impact of protests on two kinds of outcome. First, studies have examined the link between protests and policy change. This work has asked whether protests about a given issue advance the passage of relevant legislation (Agnone 2007; Bernardi, Bischof, and Wouters 2021; Olzak and Soule 2009) or increase legislative support for relevant proposals (Burstein and Freudenberg 1978; Gause 2022; McAdam and Su 2002). Second, studies have examined whether protests about a given issue increase the attention that legislators give to that issue through congressional hearings (King, Bentele, and Soule 2007; Olzak and Soule 2009; Soule et al. 1999), roll-call votes (McAdam

and Su 2002; Soule *et al.* 1999), parliamentary questions (Walgrave and Vliegenthart 2012), or congressional speeches (Wasow 2020). Taken together, this literature provides powerful evidence that protest can shape legislative politics.

Nonetheless, two shortcomings of this literature limit our ability to understand how protest affects legislator behaviour. First, existing studies have typically focused on aggregate legislative outcomes, such as the number of bills passed or congressional hearings held, rather than the behaviour of individual legislators. This matters because legislators' 'dyadic' representation of local concerns is of normative and practical importance. Moreover, aggregate-level analysis cannot easily uncover the precise mechanisms by which public protest influences legislative behaviour. Recent work has begun to address this shortcoming, with several studies linking district-level protests to the individual voting behaviour of US legislators (Gause 2022; Gillion 2012; Madestam *et al.* 2013). To date, however, no work has examined the relationship between local protest and individual legislators' behaviour outside the US.¹ Moreover, to our knowledge, no work has yet systematically investigated the relationship between local protest and the political speech of individual legislators. This is an important shortcoming, as legislators' speeches are a key element of how they give voice to those they represent (Fernandes, Debus, and Bäck 2021). Moreover, compared to roll-call votes, legislative speeches can provide a more nuanced picture of MPs' issue priorities. This is particularly true in parliamentary democracies, where parties tightly control legislative voting.

The second shortcoming of existing work is that it has focused mainly on how protest affects MPs' behaviour in the legislature, but not online. This focus is understandable, as it arguably captures legislators performing their most important and consequential role: representing constituents inside formal political institutions. Yet, in recent years, online communication has become an increasingly important avenue through which legislators interact with the media and electorate (Barberá *et al.* 2019; Castanho Silva and Proksch 2022; Enli and Skogerbø 2013). Compared to legislative behaviour, online speech is further removed from the policy-making process but is potentially more visible to constituents. In this, it constitutes a further important domain of representation and responsiveness. Therefore, a satisfactory understanding of legislator responsiveness to protest requires consideration of both online and offline political speech.

To address these shortcomings, we focus on individual legislative behaviour, both online and offline. Specifically, this paper tests an argument linking district-level protest activity to individual legislators' online and offline speech. We now explain why legislators should respond to protest in their political speech, and why this responsiveness may differ across online and offline domains.

Theory

Legislator Responsiveness to Protest

Our central argument is that legislators have an electoral incentive to respond to protests by their constituents. In line with existing work, we assume that the legislators' primary motivation is to achieve re-election, not for its own sake but as a necessary pre-condition for achieving any other political goals (Mayhew 1974). The main determinant of legislators' re-election chances is usually their party's popularity. However, under electoral systems that allow voters to express a view on individual candidates, MPs can also try to generate a 'personal vote': additional support that is attracted to them in particular (André, Depauw, and Martin 2016). In practice, legislators aim to cultivate a personal vote by persuading local voters that they have attractive qualities ('advertising'), views ('position-taking'), and achievements ('credit-claiming') (Mayhew 1974).

If legislators wish to echo their constituents' views and priorities, they must first identify them. Existing work suggests that MPs learn about their constituents' views from several sources. These

¹Wouters and Walgrave (2017) explore Belgian politicians' reactions to protest, but via survey responses, not observed legislative behaviour.

include relatively permanent features of the constituency like the presence of a military base (Soroka, Penner, and Blidook 2009), time-varying conditions such as levels of unemployment (Borghetto, Santana-Pereira, and Freire 2020), and more direct signals of public concern like petitions (Blumenau 2021). In the same vein, protests can influence legislators' behaviour by providing them with information about their constituents' views (Gillion 2012; Lohmann 1993; Wouters and Walgrave 2017). Collective action involves various costs, ranging from the simple opportunity cost of attending a protest to the serious risk of encountering physical harm or legal difficulties as a consequence (Gause 2022, 261). Protests thus highlight to legislators that an issue is sufficiently salient among a group of citizens for them to incur these costs. Of course, even large protests are typically attended by a relatively small percentage of the overall population (Chenoweth and Belgioioso 2019). Even so, protesters are demonstrably politically active and organized, so may be an important portion of voters at future elections. Moreover, the wider public may also take their cue from local protests (Lohmann 1993), giving them an electoral impact beyond simply the votes of those who attended.

How can MPs signal their responsiveness to local protests? In many parliamentary democracies, individual legislators have relatively limited influence over policy outcomes due to rules that concentrate influence on party groups, and especially the government. As a result, a more feasible strategy is so-called 'position-taking' – publicly expressing views and priorities that accord with those of the protesters. MPs have a range of venues for doing this, but two forms of communication are particularly important. First, they can speak about constituents' priorities in parliament itself. This public and publicized arena provides a highly visible platform for signalling responsiveness to constituents' priorities (Fernandes, Debus, and Bäck 2021). While very few citizens observe parliamentary behaviour directly, they can learn about it indirectly through news coverage and MPs' own publicity, hence the growing comparative evidence that representatives' individual legislative behaviour has at least some impact on their public image and electoral fate (e.g. Ansolabehere and Kuriwaki 2022; Hanretty, Mellon, and English 2021). Second, MPs can attempt to communicate more directly with voters via social media. Platforms like Facebook and Twitter provide politicians with a low-cost way of posting messages online, which can then be shared widely by their supporters. Consequently, politicians' online communication has become an important avenue for cultivating popularity with constituents (see e.g. Barberá et al. 2019; Enli and Skogerbø 2013).

We therefore expect that politicians should respond to local protests by giving greater emphasis to those protests' subject matter in their offline and online political speech.² This produces our first hypothesis.

Hypothesis 1: (MP responsiveness.) *Legislators respond to protest in their electoral district by speaking about protest-related issues.*

Online v. Offline Responses

We expect MPs' responsiveness to protests to vary for different kinds of political speech. In particular, we expect greater responsiveness in MPs' online speech than their offline speech. This is for two reasons: the greater constraints on parliamentary speech, and the differing audience of the two domains.

We first expect greater responsiveness online because MPs' online communication is subject to fewer constraints. MPs' offline speech is constrained because parliamentary speaking time is shared, finite, and organized. High demand for speaking time means that MPs may not always be able to speak on a given day or in a particular debate; i.e. speaking time is shared. By contrast,

²Note that we equate online and offline speech with social media posts and parliamentary speeches respectively. Future work might consider less direct forms of communication, such as press statements.

they can post online content whenever they like. Online speech may thus facilitate a more timely reaction to the concerns of local protesters. The limited availability of parliamentary speaking time also means that MPs must choose which issues to prioritize in their speeches; i.e. speaking time is finite. This is much less true of online speech, where MPs can – and do – post many messages in a single day, leaving them freer to address a wider range of subjects.³ Finally, MPs' offline political speech is constrained by parliamentary timetabling; i.e. it is organised. At its most prosaic, this constraint might simply mean that the parliamentary arena is unavailable on certain days, such as weekends. But even when parliament is sitting, MPs are still constrained by which issues feature on the agenda. For example, discussion on any given day might be focused on a specific bill or questions to a particular government department. MPs may thus struggle to find a relevant way to raise the issue addressed by recent local protests.

Second, the responsiveness of online and offline speech to local protests may also differ due to their likely audiences. Online communication through social media can be directly observed by voters, who often have selected into following politicians with whom they are ideologically congruent (Barberá 2015). Moreover, users of Twitter, in particular, are more politically attentive and more liberal than the general public, meaning that legislators may tailor their speech accordingly (Barberá *et al.* 2019; Mellon and Prosser 2017). By contrast, the public rarely observes parliamentary speeches directly; their immediate audience is other MPs and the watching media. Offline speech can be – and is – used for indirectly signalling to the public. But this route is highly mediated, depending on news coverage or the publicity efforts of MPs and their parties. Consequently, offline communication has a less guaranteed and less select audience. This means that MPs wishing to signal responsiveness to protesters' concerns may see online communication as a more effective way of doing so.

Online speech thus provides MPs with an immediate and unmediated avenue for signalling their sympathy with protesters' concerns. By contrast, MPs' offline speech is subject to a range of constraints and only reaches voters indirectly. We thus expect that MPs' online speech should be more responsive to local protests than their offline speech.

Hypothesis 2: (Online v. offline.) *Protest in legislators' electoral district has a larger impact on their online speech than on their offline speech.*

Data and Method

Case Details and Selection

To examine the effects of climate protest on political speech, we focus on the FFF campaign in the UK. Following the individual protest sit-in ('School Strike for Climate') by Greta Thunberg outside the Swedish parliament in late 2018, the FFF campaign (also known as 'Youth for Climate', 'Climate Strike', or 'Youth Strike for Climate') emerged as an international grassroots campaign designed to compel elected representatives to act on the impending climate crisis. The stated aim of the FFF campaign was 'to put moral pressure on policymakers, to make them listen to the scientists, and then to take forceful action to limit global warming'.⁴ The movement culminated in thousands of school strikes on named Fridays worldwide throughout the following year. The UK itself saw a considerable number of climate protests organized under the FFF banner over this period (see Fig. 1). The FFF protests explicitly sought to instil urgency into policy debates. Thunberg (2019, 57–68) chose to speak of the climate *crisis*, *emergency*, and

³The above phrasing implies that MPs post these messages themselves, but our theory does not depend on this assumption. Just like their parliamentary speeches, MPs' social media posts may be drafted by their staff (Bauer *et al.* 2023). What matters is that these messages are written for, and perceived as, signalling the position of the MP.

⁴See <https://fridaysforfuture.org/what-we-do/who-we-are/>. Last accessed: 31 May 2021. On-the-ground protests were spurred by multiple organizations under the banner of FFF. We detail these groups in Supplementary Tables APP-16 and APP-17.

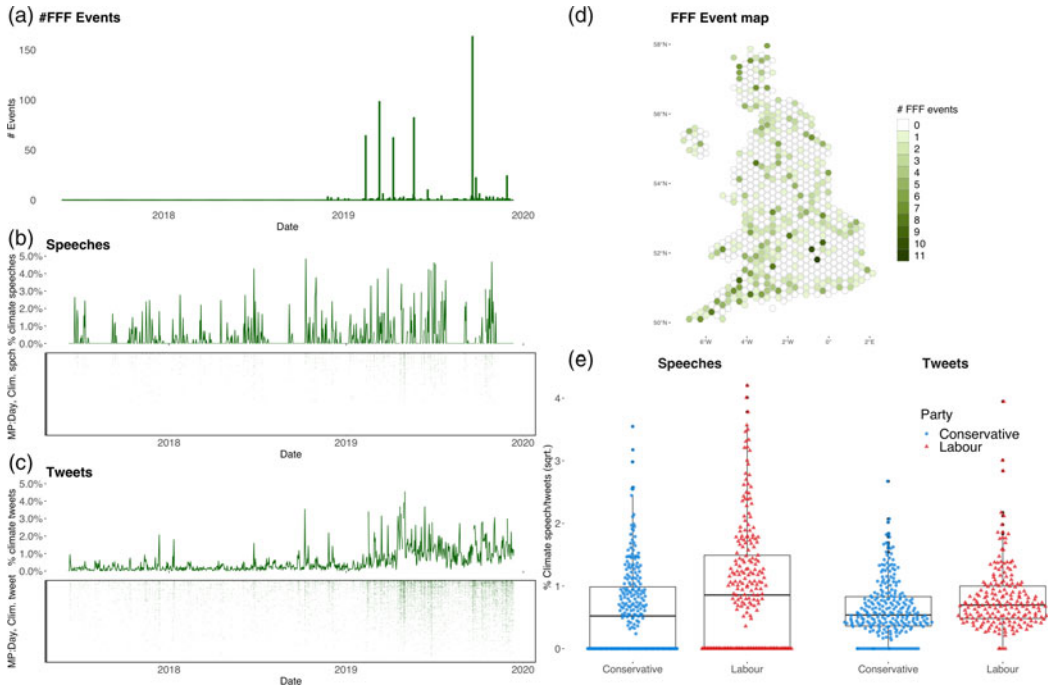


Figure 1. (a) Barplot daily sum of FFF protests; (b) Climate speeches mentioning climate keyword phrases over time. The top panel is daily frequency; the bottom panel plots our full panel dataset, where dark green tiles indicate an MP speech-day where climate keyword phrases are mentioned, and white otherwise; (c) Tweets mentioning climate keyword phrases over time. The top panel is daily frequency; the bottom panel plots our full panel dataset, where dark green tiles indicate an MP tweet-day where climate keyword phrases are mentioned, and white otherwise. (d) Map of the total number of FFF protest events by constituency over the entire observation period; (e) Kernel density plot of climate tweet and speech by two main parties. Points represent daily square root percentages of speeches/tweets mentioning climate; the width of density curve corresponds to the relative frequency at a given point in the distribution. Overlaid boxplot shows the median, first, and third quartiles of distribution.

breakdown instead of climate *change* in her speech at the UK parliament in April 2019. The following week, MPs endorsed Labour leader Jeremy Corbyn's motion to declare a 'climate emergency', which he introduced with reference to the 'unprecedented upsurge of climate activism'.⁵

For the purposes of our analysis, we set an observation period of 8 June 2017 to 12 December 2019. This period's start and end points mark the 2017 and 2019 general election dates and overlap with the peak of FFF protests in 2019. We study the effect of these protests in the UK during this period because of data availability and because it plausibly represents a most-likely case.

The UK parliament records and publishes all political speeches delivered in both Houses in the Hansard record. UK MPs are also highly active on the micro-blogging website Twitter (85 per cent had active Twitter accounts over this period), meaning we are able to draw comparisons between offline speech delivered in the House of Commons and online speech published as tweets. Geolocated FFF protest data is also available, meaning we can assign protests to politically meaningful geographic units (that is, constituencies).

We believe the UK context represents a 'most likely' case for establishing a relationship between protests and political speech for two main reasons. First, climate policy has broad support among the public and political elites, with all main parties making prominent policy pledges in this period (see Carter and Pearson 2020). Climate protests in this context might thus be best

⁵Hansard, vol. 659, col. 225, 1 May 2019.

viewed as an attempt to push parties to undertake larger and quicker measures, and to raise the salience of existing concerns. Given that the climate is a valence issue, MPs should be more willing to see climate protests as indicative of wider public opinion, and less concerned that responding to these protests would mean diverging from their party compared to a highly polarized context. Second, the UK's single-member plurality electoral system gives MPs relatively strong incentives to appeal to local concerns (André, Depauw, and Martin 2016), further increasing the likelihood of them responding to climate protests in their constituency. We are thus studying a political context that maximizes the chances of finding a relationship between climate protest and individual MPs' political speech. We see this as an advantage since our study is the first to investigate the relationship using large-*n* speech data from both offline and online contexts.

Data Collection

We use three main data sources to code our two dependent variables and the key independent variable. We collected MPs' online speech from Twitter, using the R package 'academicwitter' (Barrie and Ho 2021). To determine the full set of elected MPs with active Twitter accounts, we began with a Twitter 'list' of UK MP Twitter accounts.⁶ We then cross-checked this list against the Hansard record of all 650 MPs elected at the 2017 general election, adding accounts that had been wrongly omitted and removing accounts included in error. This process resulted in a set of 553 UK MPs with active Twitter accounts. With this set of users, we then collected all tweets (including 'retweets', 'quote tweets', and 'replies') by UK MPs using the V2 Academic Research Product Track API endpoint, which provides academic researchers with access to the full archive of all published (and as-yet undeleted) tweets. Our data includes every tweet published by an MP over this period.⁷ This resulted in a dataset of ~2.4m tweets over our observation period.

Based on this dataset, we identified all tweets that mentioned climate-related topics. We did this through a two-step dictionary expansion technique. We first trained a word embedding layer across the full corpus of MP tweets using the GloVe algorithm and the R packages *quanteda* (Benoit et al. 2018) and *text2vec* (Röder, Both, and Hinneburg 2015). Word embeddings are vector representations of words, which encode semantic meaning in the embeddings space.⁸ The distance between vectors thus provides a proxy for semantic meaning: more similar words will be closer to each other in the embeddings space (Rodriguez and Spirling 2022). This means we can use word embeddings as a discovery technique for expanding dictionaries of relevant terms (Rice and Zorn 2021). We began with a seed word 'climate' and looked up the most (cosine) similar words in our word embeddings. This resulted in an initial set of ten words by which to filter our tweets for relevant terms.⁹

These initial terms are useful for reducing the size of relevant data, but are obviously imprecise: 'climate' might refer to the 'political climate' and 'nature' may refer to the 'nature of debate'.

⁶Lists are user-compiled sets of Twitter users, usually relating to a given subject heading or shared interest. The list of 2017 MPs was compiled by @TwitterGov and is available at: <https://twitter.com/i/lists/217199644/member>.

⁷Data collection took place in April 2021. While older tweets may have been deleted by this point, we do not see any reason why deletions would systematically bias our findings. The initial ingest from the V2 Twitter API truncated retweet text over a certain length. To retrieve the full text of a retweet, we therefore used the *rtweet* R package by Kearney (2019) to look up tweets ('statuses') by the unique tweet ID of the original tweet.

⁸We set vector dimensionality to length 300 and used a window size of six. The maximum number of iterations for training the embedding layer was set to 100. We pruned the vocabulary over which to train the embedding layer to words that appear at least ten times across the corpus. This resulted in a term co-occurrence matrix of dimension 111,353 × 111,353 (i.e., 111,353 unique words).

⁹These were: 'climate': '#climateEmergency'; 'environment'; 'planet': '#climatechange'; 'pollution'; 'environmental'; 'nature'; 'carbon'; and 'emissions.' Note that we filter by ignoring case, so both upper and lowercase variants of these words are captured.

After reducing the data size with this initial filter, we then output the top 4,000 bigrams and hand coded them for relevance to climate-related issues. During this process, we also incorporated relevant unigrams (e.g. unspaced hashtag phrases like #climatechange) and trigrams (e.g. ‘green new deal’). We then sorted the climate-related terms into two lists: a general list of terms that refer to climate in the abstract (for example, ‘climate change’, ‘climate breakdown’, and ‘environmental rights’) and more specific climate-related terms (for example, ‘carbon emissions’, ‘plastic waste’, and ‘green new deal’). We refer to these as our core and expanded lists. The full lists of terms can be found in Supplementary Materials Tables APP-1 and APP-2. We use the core list to create our first dependent variable – the daily number of tweets from each MP containing one or more of the core climate terms during our study period. This results in a total of 15,182 climate-related tweets. In the supplementary materials, we present results for the expanded list of policy terms.

We used the Hansard record to compile data on offline speeches by UK MPs in parliament. Hansard records all instances of parliamentary speech; the speeches and metadata are made available by ‘TheyWorkForYou’. For our analysis, we use only instances of speech classed as ‘Speech’, which are oral questions or oral contributions to debates in the House of Commons.¹⁰ In total, we have ~150 k Hansard parliamentary speech records for our set of 553 MPs. Consistent with our measure of online speech, our second dependent variable is a daily count of the number of speeches by each MP containing one or more of the core climate terms during our study period. This results in a total of 1,774 climate-related speeches.

One concern with our technique for capturing climate-related tweets and speech data is that we do not record the speaker’s stance toward climate-related issues. That is, we might also be capturing climate-sceptic speech. We checked this by generating two random samples of 500 speeches and 500 tweets and investigated these for climate scepticism. We found no evidence of climate scepticism or denial in either sample. This supports our characterization of climate change as a valence issue in the UK context, and provides reassurance that our measure is well-suited for capturing legislators’ responsiveness to climate protests.

Finally, to retrieve data on the incidence of climate protests, we use a crowd-sourced database of FFF protests, available on the dedicated campaign website for the movement.¹¹ The data were scraped from a map of geolocated protest actions, alongside corresponding information on the town where the protest occurred, precise location (for example, ‘in front of townhall’), time, date, and link to the Facebook or Instagram event page. We assigned each protest to constituencies using shapefile constituency boundaries for the 2017 general election.¹² Our independent variable was then coded as the daily sum of FFF protest events in each constituency.

Descriptive Analysis of Climate Speech

We now present some aggregate descriptive trends in the salience of climate as a topic and the tone in which it was discussed.

Our data are daily protest, tweet, and parliamentary speech data at the constituency- or MP-level for 553 UK MPs during the 2017–2019 parliament. We plot the frequency and location of climate protests and the timing of climate speech in Fig. 1. As protests took off in 2019, so did climate-related speech. MPs sent 5.9 climate tweets per day between 2017 and 2018, but 33.9 per day in 2019. For parliamentary speech, MPs mentioned climate change 1.0 times per day in 2017–2018 and 3.6 times per day in 2019.

¹⁰This means removing, for example, ‘Procedural’ and ‘Division’ speech that records the formalities of parliamentary proceedings, such as the results of votes. These data are available as indexed .xml files at <http://parser.theyworkforyou.com/hansard.html> and compiled by Odell (2021).

¹¹<https://fridaysforfuture.org/>.

¹²We use reformatted constituency and protest shapefiles produced in QGIS for CRS consistency and locate protests to shapefiles with the aid of the `sf` and `sp` R packages (Pebesma and Bivand 2005; Pebesma 2018).

We can also observe semantic shifts in the climate speech of individual legislators using recently developed word-embedding techniques. Therefore, we apply a technique called ‘à la Carte on Text’ (ALC) to identify the differences in how MPs discussed climate change during the 2017–2019 parliament.¹³ This technique builds from recent contributions that demonstrate the efficiency gains of using pre-trained word-embedding layers to gauge semantic change across document-level covariates or, as in our application, time (Arora *et al.* 2018; Khodak *et al.* 2018). It relies on the insight that embeddings for a particular (or even very rare) target word may be derived by averaging the vectors of embeddings for words within its (here, six-word) context window from a pre-trained embedding layer.¹⁴ In this application, we use the GloVe pre-trained embedding layer (Pennington, Socher, and Manning 2014) and follow the recommendation of Rodriguez, Spirling, and Stewart (2023) by applying a transformation matrix to downweight commonly appearing words.

We can then observe temporal trends by calculating the cosine similarities between our target word ‘climate’ and a set of candidate words over time for both our tweets and speech corpus. Here, as candidate word, we use the word ‘emergency’. To recover the over-time cosine similarities, we first split our observation period into year-week slices and then find the context words around our target word, ‘climate’, for each week. We then estimate a time-period-specific embedding for the word ‘climate’ using the ALC approach. Here, we take the average of the vectors of surrounding context words (from the same pre-trained GloVe embedding layer) and then apply a transformation matrix to downweight commonly appearing words. From this procedure we are able to induce a single period-specific embedding for our target word ‘climate’ over each time period. Once we have recovered these embeddings, we can calculate the (ℓ_2 -normalized) cosine distance between the vectors for ‘climate’ and ‘emergency’ over time. We display the results of this analysis in Fig. 2.

This analysis shows that, in both MPs’ tweets and their speeches, the word ‘climate’ became more tightly related to the word ‘emergency’ in our time period, as MPs increasingly discussed climate politics in terms of a climate emergency.¹⁵ Notably, this semantic shift arose in 2019 around the time of the FFF protests, which aimed to reframe climate discourse to demand greater urgency. This shows changes in political speech that mirror the demands of the FFF protesters. This analysis lends plausibility to the idea that the FFF protests may have shaped political speech in the UK. Nonetheless, this analysis tells us little about whether this macro-level development is driven by a micro-level relationship between local protests and MPs’ attention to climate as a political issue. This is the focus of our main analysis, which we now turn to explaining in more detail.

Estimation

We create a panel dataset for each of the 918 days in our observation period for each of our 553 MPs (when still in position). In addition to our two dependent variables and key independent variable, we incorporate further information for each MP. We use the `parlitools` R package (Odell 2017) to code MPs’ party.¹⁶ We also include a binary variable indicating any periods when an MP served as a minister or shadow minister, based on Colebrook and Priddy (2020) and the UK parliament data portal.¹⁷ Three MPs in our dataset did not serve their full term in parliament due to resignation, death, or a recall petition. We only include data for these MPs up to the date

¹³To conduct this analysis, we use the R package `conText` developed by Rodriguez, Spirling, and Stewart (2023).

¹⁴The ALC approach is more computationally efficient than alternative approaches that require training new embedding layers for each time period of interest (e.g., Rodman 2020).

¹⁵In the supplementary materials, we demonstrate using another ALC approach that this language of greater urgency was not limited to the word ‘emergency’.

¹⁶Some MPs changed party affiliation during the parliament due to suspensions and/or defections. In such cases, we retain their initial affiliation.

¹⁷See <https://members.parliament.uk/>. Last accessed: 4 May 2021.

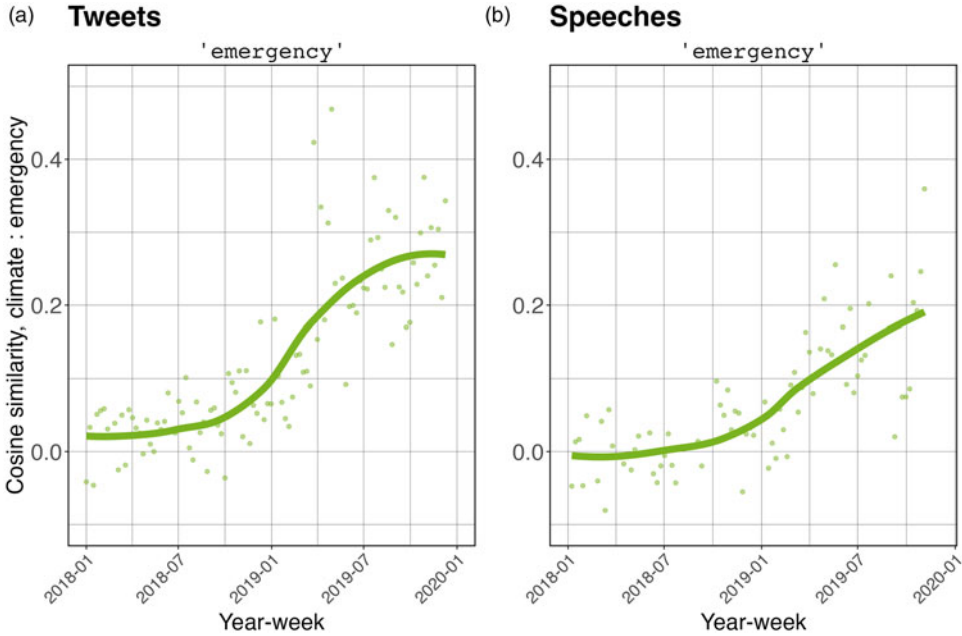


Figure 2. Weekly cosine similarities between 'climate' and 'emergency': (a) MP tweets and (b) MP speeches. Lines show loess regression smoothing with bandwidth set to one.

of the by-election for their replacement. Our analysis excludes the new MPs elected at these by-elections, all Sinn Féin MPs (who do not take up their seats), and any MPs who served as Speaker or Deputy Speaker (who chair debates rather than participating in them).

We appreciate that the underlying propensity to discuss climate change varies across MPs – partisan identity, constituency makeup, and knowledge about climate change necessarily differ across officials. However, these are stable traits that we do not expect to change in our relatively brief observation period. Therefore, we include MP-level intercepts that control for these fixed MP-specific effects. This allows the effect of climate protests to be recovered as a difference in climate speech from the average number of climate speeches for a given MP. Since MPs overlap entirely with constituencies, MP fixed effects also absorb all unobserved constituency-level heterogeneity, including the underlying constituency-level propensity for climate protest.

We must also be sensitive to changes in the incidence of climate speech and climate protests. Both of these key variables increase over time (see Fig. 1), which could confound the effects of protests on legislator behaviour. We mitigate this in two ways. First, given our exceptionally high-frequency (daily-level) and high-resolution (constituency-level) data on both speech and protest, we can precisely locate both variables in space and time. This means that any change in MPs' climate speech can be attributed to changes in climate protest at their constituency level. Second, we include a vector of time dummies that absorb common trends and shocks across all MPs; for example, accounting for a possible rise in climate speeches and protests around the annual United Nations climate negotiations or the visit of Greta Thunberg to the UK in April 2019. Our high-frequency data allows us to consider year-by-month and, later, year-by-week fixed effects. Taken together, the inclusion of MP and time fixed effects allows the effect of climate protest on legislator speech to be recovered through deviations in the incidence of protests from the long-term average in a given constituency, the average political speech behaviour of an individual MP, and common temporal shocks across constituencies. This specification relies on a version of the parallel trends assumption. In the supplementary materials, we

consider extensions that include time-varying MP-level covariates, MP-specific time trends, and a placebo test that replaces the treatment with a measure of foreign protests (table APP-4).

Our main estimating equation is then based on the following functional form:

$$\text{Climate Speech}_{i,t} = \beta \text{FFF Protest}_{i,t} + \gamma \mathbf{X}_{i,t} + \alpha_i + \delta_d + \epsilon_{i,t} \quad (1)$$

where i indexes MPs (and necessarily constituencies), t indexes days, d indexes our measures of time controls (time fixed effects), \mathbf{X} is a vector of covariates that contains the sum of an MP's speeches or tweets on that given day t , and will later contain a time-varying dummy for an MP's frontbench status. Controlling for the total number of speeches/tweets in this manner means we model the relative emphasis MPs place on the climate, holding constant their daily propensity to make speeches or publish tweets. Note that, in this specification, we are measuring protest and speech at the daily-level t and controlling for temporal trends and shocks at a higher level of aggregation d (months, weeks). We estimate an ordinary least squares (OLS) regression with standard errors clustered on the MP. In the supplementary materials, we present all the results for binary measures of climate speech and the expanded dictionary of policy terms, as well as several robustness tests.

Results

Protests and Online Speech

What effect do local protests have on legislators' speech? We begin with legislators' online posts on Twitter. Table 1 contains our baseline models of the average effect of local climate protests on MP tweets. To measure the timing of climate speech, we construct a time window that includes the date of the protest t (mostly Fridays) and the following day (e.g., Saturday), thereby allowing MPs to respond after the protests. We index this operationalization as 'FFF Protest $_{t,t-1}$ ' in Table 1. We find a clear positive effect of local climate protests on MP tweets. Models 1 and 2 are estimated with year-month fixed effects, and models 3 and 4 are estimated with more exacting year-week fixed effects. Models 2 and 4 add a binary indicator of whether an MP held a frontbench position in the Labour or Conservative party on that day. The effect of protest is stable and robust across specifications. These results suggest a direct channel of responsiveness from MPs to their constituents' demands. From Model 4, a local FFF protest is associated with an increase of 0.109 [0.066, 0.152] climate tweets, or a roughly 0.46 standard deviation increase in the number of climate tweets.¹⁸

We also investigate how the effect of protests on MP tweets manifests over time. The effect of protests may be strongest on the day of or immediately after the protests, as MPs seek to signal responsiveness to local concerns. Figure 3 plots the coefficient for FFF protests on MP climate tweets, with protests summed over days within a window. The horizontal axis indexes the number of days in the window, with 1 indicating that we only include tweets on the day of the protest (e.g., a Friday) and 2 indicating a two-day window where MPs may tweet about climate on the day of the protest or the following day (e.g., Friday and Saturday, as in Table 1), and so on. We find the strongest effect on the day of the protest ($\beta \approx 0.211$ [0.132, 0.290]), and the effect diminishes as subsequent days are added. We also do not find that MPs increase (or decrease) their climate tweets in anticipation of the protest when we reverse the order of climate protests and tweets.

Given that FFF protests generally occur on Fridays, one concern may be that MPs re-arrange their pre-existing stock of climate tweets to release them on Fridays, which would displace tweets

¹⁸We interpret the coefficient directly, as the standard deviations of both the FFF protest and the climate tweets variables are nearly identical in their raw form and after applying the fixed effects. 226 constituencies feature climate protests, while 327 do not.

Table 1. Direct effect of Fridays for Future protest on MPs’ tweets

	M1	M2	M3	M4
FFF Protest _{tt-1}	0.123** (0.022)	0.123** (0.022)	0.109** (0.022)	0.109** (0.022)
Tweets (daily sum)	0.005** (0.001)	0.005** (0.001)	0.005** (0.001)	0.005** (0.001)
Frontbench		0.015* (0.006)		0.015* (0.006)
Observations	505,938	505,938	505,938	505,938
Unit fixed effect	MP	MP	MP	MP
Time fixed effect	Year-month	Year-month	Year-week	Year-week

The outcome is the count of climate tweets; treatment is FFF protests on day_t and day_{t-1}; standard errors clustered by MP are in parentheses; * = $p < 0.05$, ** = $p < 0.01$.

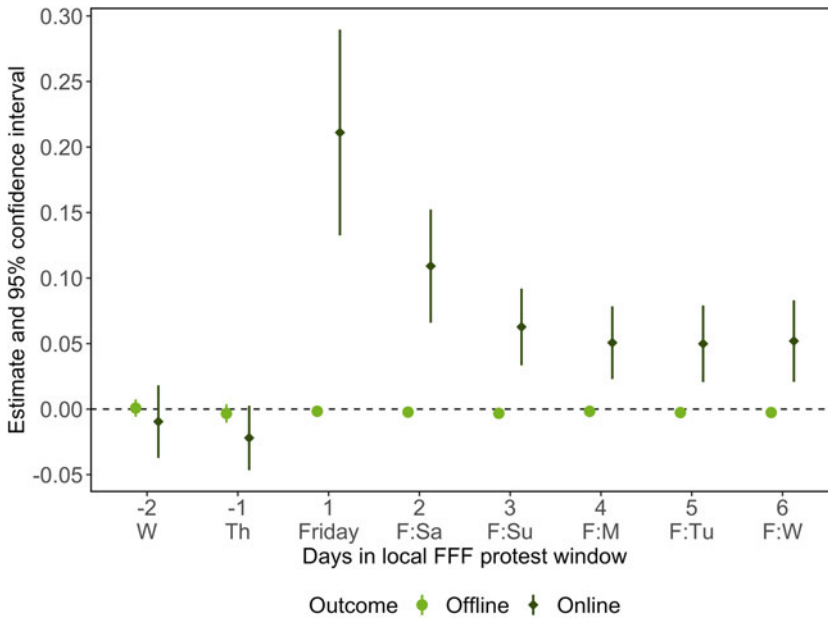


Figure 3. The direct effect of FFF protest on MPs’ tweets is strongest on the day of the protest. Weekday markers are indicative but not strictly accurate, since some FFF protests (9.7 per cent) do not take place on Fridays.

in time but not affect their volume. We rule this out by showing large changes in the total volume of climate tweets during the observation period (Fig. 1 and APP-3). We also show that the effect of protests holds when only considering the first local FFF protest for each MP, which may be more surprising than predictable recurring protests (Table APP-4).

Another consideration may be that MPs are treated multiple times during the observation period. This implies that different conditions are pooled at values of zero in our protest indicator because some MPs will have never had protests, while other MPs had protests in the past but not on that day. To address this potential causal heterogeneity, we construct a cumulative count of local protests and interact this with our daily measure of protests to allow for a larger effect for MPs with more protest exposure (Table APP-4). However, we do not find a statistically significant interaction term.

Online and Offline Speech

Next, we consider differences between online and offline speech. Hypothesis 2 predicted that protest would have a larger effect on online speech compared to offline speech. In Table 2, we extend

Table 2. Effect of protests on online and offline speech

	M5 Tweets	M6 Speeches	M7 Tweets	M8 Speeches	M9 Tweets	M10 Speeches
FFF Protest	0.109** (0.022)	-0.002 (0.002)	0.152* (0.071)	-0.009 (0.014)	0.021 (0.027)	0.007 (0.010)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Unit of observation	Daily	Daily	Weekly	Weekly	Sitting days	Sitting days
Unit fixed effect	MP	MP	MP	MP	MP	MP
Time fixed effect	Year-week	Year-week	Year-week	Year-week	Year-week	Year-week
Observations	505,938	505,938	86,623	86,623	199,738	199,738

Outcomes are counts of climate tweets/speeches; standard errors in parentheses; * = $p < 0.05$, ** = $p < 0.01$.

our baseline Model 4 from Table 1 to consider the relationship between protest and offline speech in the House of Commons. Model 5 reproduces the results from Model 4, and Model 6 mirrors this analysis with offline speech as the outcome variable. We find a very small coefficient that is not statistically significant. Figure 3 shows similar estimates near zero for the effect of climate protests on offline legislative speech across different protest time windows. We recover the same pattern for binary measures of climate speech and the expanded dictionary of policy terms (Tables APP-7 and APP-10).

Given that the data-generating process differs for online and offline speech, we hesitate to place too much emphasis on this result in isolation. The modal climate protest is on a Friday when MPs often return to their constituencies, and the Commons very rarely sits at weekends. Note that whether parliament is sitting or not on a particular day affects all MPs' opportunities to speak, and so is captured in the time fixed effects and covariates that count MPs' speeches in parliament that day. Nonetheless, it is important to consider heterogeneity in online and offline speech with additional measures that more closely match parliamentary speech's data-generating process.

We aggregate the daily protest and online and offline speech data to the week level.¹⁹ This allows an effect of protests on speech to be detected in the seven-day window following a Friday protest. Model 7 recovers the same positive and statistically significant effect of protests on climate tweets at the weekly level. However, in Model 8, we find no effect for offline speech.

We consider a further specification motivated by the parliamentary calendar. We introduce a new unit of analysis at the parliamentary sitting-day level, explicitly accounting for when parliament is sitting. We take the time between one parliamentary sitting day and the next, which may be short (for example, Monday to Tuesday) or longer (for example, Thursday to Monday) and aggregate the number of local protests and speeches in that window. We then estimate the effect of local protests on speech at the next time parliament is in session, controlling for the number of days between sittings. In this specification, the effect of protests on tweets may be noisier – since the unit of analysis pools many days together – but this unit maximizes MPs' opportunities to speak on climate in parliament. However, even with this accommodating specification, we do not find a statistically significant effect of protest on offline speech in Model 10. Across these three specifications, we have a very small estimated effect of climate protests on offline speech that flips signs.

Finally, we consider climate speech during a period of heightened parliamentary attention to climate change in the autumn of 2019. The UK e-petition system allows citizens to start petitions, and petitions that gather over 100,000 e-signatures are considered for debate in parliament. Two climate-related petitions passed this threshold and triggered debates. The first, entitled 'Demand the EU and UN sanction Brazil to halt increased deforestation of the Amazon', reached 123,309 signatures and led to a parliamentary debate on 7 October 2019; the second, 'Restore nature on a

¹⁹Here, we use weeks starting on Fridays to match the protest schedule.

massive scale to help stop climate breakdown', gathered 109,076 signatures and triggered a debate on 28 October 2019.²⁰ For our purposes, the success of these two petitions provides an additional opportunity to estimate the effect of climate protest on political speech. They represent occasions when climate change was clearly on the agenda and had been placed there in response to direct public demand, thereby giving MPs a clear opportunity to publicly signal their responsiveness to the concerns of local climate protests. As such, they may constitute a critical case for establishing the effect of climate protest on offline speech.

We code a binary measure of whether an MP spoke on climate during each of these petition-induced debates. Because we are estimating the relationship between protest and speech in two cross-sections, we lose the MP and time fixed effects that we relied on previously for identification. As such, we present these results with the caveat that they should not have the same causal interpretation as those above. Nonetheless, to address confounding between climate protest and political speech, we include controls for MPs' sum of climate speeches in parliament, their political party, frontbench status, sum of parliamentary speeches, and whether they spoke in parliament on the day of the debate. We operationalize FFF protests through an interaction effect of a binary measure of local protests in September 2019 and the cumulative number of local protests to date. This allows the effect of recent protests to be larger for constituencies that have seen substantial protests. In Table 3, we recover positive coefficients for the interaction term, but these are not statistically significant at conventional thresholds ($p_{\text{Deforestation}} = 0.079$, $p_{\text{Restore nature}} = 0.067$). Even during this period of heightened awareness and engagement on climate change, MPs hesitated to discuss climate change in the House of Commons following local climate protests.

In sum, we have strong evidence that the effect of protest on legislators' political speech differs across online and offline contexts. While Hypothesis 2 predicted a smaller effect of protest on offline speech, we did not expect to find no effect. Consequently, this hypothesis receives only qualified support.

Heterogeneous Effects

Our argument and results have focused on the average effect of protest across MPs. We believe this is a compelling approach because climate change in the UK is a valence issue, and the FFF protests have been received favourably by the public. Nonetheless, certain types of MPs may respond more than others. For example, MPs that have already adopted pro-climate positions may be particularly likely to respond.

We examine heterogeneous effects using MPs' memberships in political parties, parliamentary groups, and climate-related networks. We interact protest with these stable group memberships to allow the effect of protest to vary across MPs. We first show that members of the All-Party Parliamentary Group on Climate Change respond more than other MPs in their tweets, but not in their offline speech. Similarly, Labour MPs respond more to local protests than Conservative MPs, but again only for tweets. This may reflect that the Labour Party is more of an issue leader on climate, but also that widespread protests express some dissatisfaction with the current government that opposition MPs may be more likely to rally behind.²¹ Of course, Labour MPs also represent systematically different kinds of constituencies, so we cannot distinguish a constituency effect from a partisan effect. Among Conservative MPs, we find that members of the Conservative Environment Network respond more than non-members, but also that

²⁰Both were discussed in the ancillary debating forum of Westminster Hall, rather than the main Commons chamber.

²¹An additional analysis does reveal that Labour MPs were more likely to attend climate strike protests – and tweet about them. Eighteen Labour MPs attended protests on twenty-two separate occasions; four Conservative MPs attended protests on four separate occasions. Full details of these MPs are listed in Supplementary Materials Table APP-18.

Table 3. Relationship between FFF protests and legislative speech during two petition-triggered debates in October 2019

	M11 Speeches	M12 Speeches
FFF (September)	-0.016 (0.021)	-0.025 (0.022)
FFF (cumulative)	-0.004 (0.008)	-0.008 (0.008)
FFF (September × cumulative)	0.017 (0.009)	0.017 (0.010)
Debate	Deforestation	Restore nature
Covariates	Yes	Yes
R^2	0.064	0.052
Observations	550	550

The outcome is a binary measure of climate speech during petition debates; regressors are local FFF protests in September, cumulative local FFF protests, and their interaction; standard errors in parentheses; * = $p < 0.05$, ** = $p < 0.01$.

Conservative members of the Net Zero Scrutiny Group are no more or less likely to respond than their other Conservative colleagues.²² The full models are in Table APP-3.

Discussion and Conclusion

We set out to explore the effects of climate protest on the timing and substance of political speech in the UK between 2017 and 2019. The effect of protest on legislative politics, and elite-level politics more generally, has received considerable attention in recent years. Our contribution advances this literature by using granular information on climate mobilization and speech to understand the effects of protest on individual-level legislative behaviour. We also distinguish between offline and online domains.

We first demonstrated a pronounced uptick in climate-related speech both online (on Twitter) and offline (in parliament) during this period, as well as a semantic shift toward language of greater urgency. Our main analysis examined whether FFF protests affected individual MPs' online and offline speech. We expected that protests in an MP's constituency would heighten their attention to the climate. However, we also expected MPs' responsiveness to protest to be greater in their online than offline speech. Overall, we found that climate protest influenced the timing of legislators' online political speech. MPs became more likely to tweet about the climate in the immediate aftermath of protests in their constituency. However, we found little evidence of responsiveness in MPs' offline speech, and the effects are substantively small.

As a most likely case, readers may question what inferences can be drawn from our findings for other political contexts. We suggest the following scope conditions. We expect a stronger response in contexts where climate change is debated as a valence issue along which parties compete (as opposed to a polarized issue across which they compete). Similarly, climate protests are likely to trigger the strongest responses under candidate-centred electoral systems that link MPs more closely to local concerns, compared to party-centred electoral systems. Finally, we expect to find this effect when legislators' speech is not tightly constrained by institutional rules or partisan norms.

The finding of no offline responsiveness to climate protest ran counter to our expectations. We theorized that offline speech is more costly than online speech for elected representatives, but we nonetheless expected to identify at least some protest effects across both contexts. One possible explanation could be that speech in parliament constitutes a more formal and lasting contribution to elected MPs' records than online speech, which is cheaper, more ephemeral, and more easily scrubbed. Consequently, MPs may be more hesitant to respond to cues from protest. A further potential explanation reflects that 2019 saw an uncommon amount of attention devoted to a single issue – Brexit. Brexit-related issues may have out-competed climate-related questions on

²²Note that the Net Zero Scrutiny Group was formed in 2022, after our observation period, so this membership is post-treatment and should not be interpreted causally.

the parliamentary agenda. These factors may have limited the influence of protest on offline legislative speech. A final possibility is that we may be seeing substitution effects between offline and online contexts. Given that MPs' online audience tends to be selective and less mediated, they may prefer to use these platforms when their goal is primarily to signal an issue position rather than an attempt to influence legislation. Whatever the explanation, this unexpected finding points to questions for further exploration.

This paper's approach and findings suggest various interesting avenues for future work. Substantively, as discussed above, more work is needed to understand how and why MPs' online and offline political speech differ (see also Castanho Silva and Proksch 2022). This work might explore whether institutional features of UK politics, heterogeneity across individual legislators, or attributes of the substantive policy topic drive such differences. Empirically, a natural way to study this question is by linking legislative speech records with the hundreds of MPs who tweet. Our paper provides one possible framework for this kind of research. Finally, the link between local protests and legislator speech suggests one channel of responsiveness in climate politics. However, protest movements are rarely satisfied with words alone. Future work could investigate how these specific protests affected policy reforms in the UK and elsewhere. This would help to understand whether changed political rhetoric is a precursor to meaningful policy change, or merely a substitute for it.

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Data availability statement. Replication Data for this article can be found in Harvard Dataverse at: <https://doi.org/10.7910/DVN/RV8AKC>

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