Media Bias in Public Service Broadcasting: Evidence from the BBC*

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August 31, 2018

Abstract

Public Service Broadcasting is a popular form of news consumption in many European countries. In this paper, we document and analyze bias in the TV news content of the oldest and the largest public broadcaster in the world, the British Broadcasting Corporation (BBC). Following Laver, Benoit and Garry (2003), we compare the similarity of language in news transcripts to speeches in the UK Parliament from 2013-2016. We find consistent pro-Labour bias relative to Conservative party, for all but the period after the 2015 election, where we find a pro-Conservative bias. This shift in bias towards language more similar to Conservative speeches is also evident in online news reporting on bbc.com, and is robust to alternative specifications and placebo tests. Further, topic modeling analysis shows that the bias stems from BBC spending more time covering topics that are Conservative in nature. These findings suggest that shifts in bias stemming from political power and control may be evidence of a “weak” form of media capture in the UK.

*Preliminary, please don’t circulate.
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1 Introduction

The importance of the role of media on the functioning of the political process and democracy has long been recognized. Carlyle (1841) equated access to printing press with democracy itself, arguing that the ability to speak to the whole nation is a “power ... with inalienable weight in law-making.” (pg. 141). Lippmann (1922) further argued that the power of agenda-setting enables media to set the discourse and influence political discussion (pg. 197, and also Cohen 1962). The role of media and news reporting has been at the forefront of two most recent surprise election outcomes of 2016: the impact of “fake news” on the US Presidential race between Trump and Clinton (Tavernise 2016), and the media coverage of the EU membership cost savings claims in the UK “Brexit” vote (Stone 2016).

The growth of online news consumption, and the role of online news aggregators generally, poses further difficult questions (Athey 2014), and raises new concerns that like-minded citizens may consume information in “echo chambers,” with significant long-term consequences on social interaction and political decision-making (Sunstein 2001). This further underscores the importance of media outlet reporting along different viewpoints and the effect it has on consumer segmentation.

A large strand of economic research has emerged on analyzing media reporting, and in particular, media bias, in commercial outlets (Gentzkow and Shapiro 2010, Puglisi and Snyder 2016). There has been little research, however, examining bias by public service broadcasters (PSBs) (Durante and Knight 2012). This is despite the fact that PSBs are the popular form of news consumption in many European countries: 48% get their news from BBC in the UK (Newman 2017), 39% get it from SRF in Switzerland (SRG SSR 2017), and with similar figures for other countries (e.g., 44% in Finland (Sauri 2006) , and 65% in Denmark (TNS/Gallup 2007)). Moreover, compared to commercial counterparts, the public broadcasters play an important role in the political process: they provide more “hard” vs “soft” news (Esser, de Vreese, Strömbäck, van Aelst, Aalberg, Stanyer, Lengauer, Berganza, Legnante and Papanassopoulos 2012), and their viewers contribute more to the democratic process (Fraile and Iyengar 2014).

A priori, the direction of bias in public broadcasting is not obvious. The PSBs themselves often have a stated mission to present the news as objectively as possible. For example, the mission of
the British Broadcasting Corporation (BBC) is to be “… independent, impartial and honest”.

Theoretically, there are also justifications both for demand-driven (Mullainathan and Shleifer 2005), and supply-driven bias (Baron 2006). Demand-driven bias arises, when media outlets present news more in line with preferences of their consumers. This may be the case for public broadcasters, as their widespread popularity suggests viewers are drawn to their reporting. Supply-driven bias arises when news reporting is influenced by the ideological positions of the media owners, regulators or journalists. The organizational structure and funding of PSBs suggests a potential political bias: PSBs’ main revenue streams are typically controlled by government bodies and their executive boards are usually appointed by the ruling party. Measuring the actual bias of public broadcasters is therefore an empirical question.

In this paper, we aim to close the gap by measuring and determining the change in bias in the BBC, the oldest and the largest public service broadcaster in the world. Using measure of slant similar to Laver, Benoit and Garry (2003), we compare the BBC TV news broadcast transcripts from 2013 to 2016 to UK Parliament’s two major party speeches, Conservative and Labour. We find that for the data period we study, in almost all months the BBC broadcasts have pro-Labour bias. There is, however, one exception – in the summer of 2015, the bias changed temporarily to pro-Conservative. This change coincides with a time when the BBC came under intense political pressure by the ruling Conservative government, who in July 2015 released the “BBC Charter Green Paper”, recommending reducing the size and scope of the BBC. Our findings may then be viewed as evidence of “weak” form of media capture, where political pressure forces the broadcaster to report news more in line with the preferences of the ruling party.

At the heart of the bias measure is the underlying idea that politicians from different parties may discuss the same issue using different terms. And the UK is no exception. For instance, the Welfare Reform Act of 2012, passed by the Conservative government coalition included a provision to reduce government subsidies to underoccupied residencies, or houses deemed with “room to spare.” The Conservatives addressed the issue as “spare room subsidy,” whereas the Labour party, strongly opposed to the measure, referred to it as “bedroom tax.” The phrase usage also extends to other issues. For example, the Conservatives refer to “housing market,” whereas Labour talks about “housing crisis.” Or in the labor market, Conservatives talk about “private hire,” while the

1http://www.bbc.co.uk/corporate2/insidethebbc/whoweare/mission_and_values
Labour party discusses “employment support.”

The release of the “Green Paper” followed the May 2015 Parliamentary elections, where Conservatives surprisingly gained 24 additional seats, earning an outright majority and control of the House of Commons. Immediately following the elections, the Conservative party, and Prime Minister David Cameron in particular, claimed that the BBC had provided unfair coverage of the party’s campaign and opened discussions about possible reforms to the BBC and its funding model, culminating into release of the “Green Paper.” We document that BBC content did not change immediately after the election, but rather follows the “Green Paper” publication.

We conduct further robustness and placebo tests to confirm our findings. As an alternative measure of BBC content and its bias, we also study bbc.com news articles. It contains reports from BBC journalists around the world, and, relative to BBC TV, can be more international in coverage. This may make their content less susceptible to UK politics and political speech. We find the same effect for bbc.com news articles as we did for BBC TV content. The effect, however, is not present, when we conduct the same analysis for the New York Times content. This serves as a placebo test for whether effects similar to BBC are also present in other news channels.\(^2\)

We further unpack our bias measure, to get better understanding of the source of bias change. BBC reporting could become more similar to Conservative speech either by using higher number of phrases spoken exclusively by Conservatives, or by increasing the usage frequency of each of the phrases. We find evidence for the latter: during the change in bias the BBC used Conservative-leaning phrases in higher frequency. Incidentally, the frequency of Labour-leaning phrases also increased during this period, albeit to a lesser degree. Together, they underline an overall increase in the polarization of BBC content.

We expand on the bias measure by going beyond phrase selection, and analyze whether bias can also be driven by different topics reported. These results are further confirmed through topic analysis, where we look at which issues BBC TV decides to cover and how much time is devoted on each. We implement Latent Dirichlet Allocation (LDA) (Bleietal2003) to identify the topics in

\(^2\) In future analysis, we plan to calculate bias for a range of British newspapers. The purpose is twofold: first, it will provide a benchmark of where BBC bias measure lies in relation to the spectrum of UK newspapers, some of which have well-known political leanings. And second, it will show how other UK news reporting channels changed their bias around the same time period.
UK Parliament debates and in BBC TV content. LDA is widely used tool in computer science, and becoming increasingly popular in social sciences, to uncover natural labels in a document. We find large variation in the amount of time devoted both between topics and also within a topic by each party. For topics, with a priori Conservative leaning, we find they are discussed more by Conservative MPs. We find similar results Labour-leaning topics. BBC content follows closely in covering important policy discussions of the day, but it devotes more attention to topics favored by Conservatives.³

Our contribution is twofold. We add to the growing literature on media bias, by analyzing an important, but overlooked media channel – public broadcasters. Our results show how institutional settings, different for commercial counterparts, may drive the results of weak form of media capture even for the largest public broadcasters in the world. We further supplement our analysis by analyzing both phrase and topic selection, and find evidence of bias change in both dimensions.

The rest of the paper is organized as follows. Section 2 provides the literature review, section 3 presents the data, section 4 discusses the methodology, section 5 presents the main results and the robustness checks, and finally, section 7 concludes.

2 Literature Review

Our analysis touches on three strands of literature. The analysis of media bias touches on three strands of economic and political science research. The first literature documents the prevalence of media bias, largely by commercial outlets. The first important step is specifying how bias can be measured. One approach is to measure content that is explicitly favorable to a given political party (or measure a lack of content unfavorable to that party). Examples include political endorsements by newspaper editorials (Ansolabehere, Lessem and Snyder 2006, Puglisi and Snyder 2015) or how much coverage is devoted to economic news or political scandals that are harmful or beneficial to certain political parties (Puglisi and Snyder 2011, Puglisi 2011, Lott and Hassett 2014). In the context of television markets, bias has also been measured by how much airtime is given to members of different political parties (Durante and Knight 2012).

³We also plan to extend the topic analysis for the entire sample period, to understand better the structure of measured bias for the entire period.
An alternative approach to measuring bias considers the language used by media outlets relative to that used by politicians of known political leanings. This occurs in two steps. First, following a large literature in computer science and language processing (Harris 1954, Aas and Eikvil 1999), words and phrases are assigned a numerical “slant” by measuring their relative frequency of use by politicians or political entities from one side of the political spectrum relative to another (e.g. Democrat versus Republican, Labour versus Conservative). Second, the researcher calculates the bias of a media outlet by measuring the average slant of the words and phrases used by that outlet. The phrases evaluated can be either preset, with relative intensity calculated from political speeches, or both the phrases and their relative intensity can be determined simultaneously. Groseclose and Milyo (2005), for instance, use mentions of left- and right-leaning think tanks by politicians and compare their frequency in news outlets. Laver, Benoit and Garry (2003), Gentzkow and Shapiro (2010), and Gentzkow, Shapiro and Taddy (2016b) identify both phrases and relative intensity by how likely a given phrase is to be used almost entirely by one political party. Alternatively, media bias can be assessed by the tone of the text, and evaluated by whether a given article is more or less favorable to a given political party (Gentzkow, Glaeser and Goldin 2006, Soroka 2012).

Using these methods, Groseclose and Milyo (2005), Ansolabehere et al. (2006), and Lott and Hassett (2014) find liberal bias in US newspapers and media outlets, while Ho and Quinn (2008) and Puglisi and Snyder (2015) find evidence of an unbiased media centered around the median voter.

A second, and somewhat overlapping, literature has analyzed the determinants of media bias. In a market setting, media bias can be driven by demand- or supply-side forces, and competition with other media outlets can influence the magnitude of bias. The theoretical rationale for demand-driven bias is straightforward: different consumers may prefer different slant in their news (Mullainathan and Shleifer 2005), providing incentives for publishers to segment the market accordingly (Gentzkow and Shapiro 2010). Competition can increase or decrease bias by increasing “accuracy” (Gentzkow and Shapiro 2006), or by creating niche markets of “echo chambers” (Martin and Yurukoglu 2017). Supply-driven bias is theoretically less plausible: with competition, bias can be driven to zero if producers place sufficient weight on profits relative to bias (Gentzkow, Shapiro and Stone 2016a). Empirical evidence of demand-driven bias has been found by Gentzkow and Shapiro (2010) and Larcinese, Puglisi and Snyder (2011), and there are several examples of supply-driven bias (?. ?).
Supply-driven bias becomes more relevant when profits and bias are potentially correlated: the existing literature has examined this channel by looking at the effect of advertising on reporting bias. Reuter and Zitzewitz (2006) finds that recommendations about investments in mutual funds by financial newspapers and magazines are biased in favor of advertisers, and Reuter (2009) finds the same for wine ratings by expert journals. Similarly, Gambaro and Puglisi (2015) finds that newspapers report more about a company’s press releases if the company has purchased ad space in the newspaper. Beattie (2017) documents that advertising from carbon-emitting firms changes the tone of newspaper coverage towards climate change skepticism. Beattie, Durante, Knight and Sen (2017) show that advertising purchases by auto manufacturers leads to less coverage of car safety recalls about the vehicles of the advertisers.

Supply-driven bias may also be caused by political entities. Without regulation or political competition, this may take an extreme form where the government “captures” the media (Besley and Prat 2006), i.e., when they control media content and how it is reported. For example, Djankov, McLiesh, Nenova and Shleifer (2003) present cross-sectional evidence of the media being used by governments to limit economic and political freedom. Enikolopov and Petrova (2016) specify conditions when media capture is more likely to happen, such as lack of political competition or recent regime change, and Yanagizawa-Drott (2014) and Adena, Enikolopov, Petrova, Santarosa and Zhuravskaya (2015) provide empirical evidence in support of theories of media capture.

Much of this literature analyzes commercial, government-owned, or government-controlled media; a third literature shows that Public Service Broadcasters are different. Following the model (and the motto) of the UK’s British Broadcasting Corporation (BBC), the goal of many PSBs is to “inform, educate, and entertain:” to ensure that diverse and high-quality programming is supplied which caters to all interests and communities, and to provide programs that yield educational and other social benefits independent of commercial influences (Crawford 2016). For example, research has shown that PSBs produce more “hard” versus “soft” news, in that they deliver higher level of political information and increase awareness for public affairs (Esser et al. 2012). They are also a popular form of news consumption (Curran, Iyengar, Brink Lund and Salovaara-Moring 2009), and there is evidence that their viewers contribute more to the democratic process (Fraile and Iyengar 2014). Prat and Strömberg (2006) argue that political information is a public good and that voters who spend resources obtaining information to keep their political leaders accountable
produce a positive externality, providing one rationale for public funding of PSBs. This line of reasoning further strengthens the argument that PSBs play a particularly important role in the democratic process.

Latent Dirichlet Allocation is widely used in computer science since 2003 with the introduction of (Blei et al. 2003), it has just been recently getting traction in economics. Hansen et al. (2018) use it to analyze topics during FOMC meetings, and so and so also use it to analyze for the other meetings. Other type of topic modeling techniques have been used to look into the effects of speeches into Fed decision making.

There have been few studies of bias in PSB news content. Latham (2013) analyzes the content of BBC news online using methods similar to Groseclose and Milyo (2005). He measures the number of mentions of left- and right-leaning think tanks relative to mentions in newspapers with known bias, finding evidence of left-of-center slant. The BBC itself conducted an analysis of its content by measuring how issues were presented and discussed on its TV and radio channels (BBC 2013). Taking a sample of one month of TV programs, they found Conservative politicians received more airtime than other parties. This paper expands on both studies in several dimensions: by looking at the entire content of BBC’s news, and by analyzing a longer time horizon, where several important political events could potentially be reflected in news reporting. Furthermore, we look at the content of BBC news both online and on TV, thus exploring possible similarities and robustness of our findings. This is especially relevant since different datasources were employed to get the content of TV and online.

3 Data

We are interested in documenting the presence and extent of bias between 2013 and 2016 in the TV news programs of the British Broadcasting Corporation (BBC), the oldest and largest (by employment) public broadcaster in the world. 4

As described above, we first assigned partisan word scores to phrases and then measured the bias in BBC news programs. Given the structure of UK politics, we selected the UK House of Commons

4The German PSB, Arbeitsgemeinschaft der öffentlich-rechtlichen Rundfunkanstalten der Bundesrepublik Deutschland (ARD), has the largest budget among PSBs worldwide.
as the primary source of political decision-making in the UK and that the speech of its members were likely to be representative of political party identity in the UK.\(^5\) We therefore downloaded the transcripts of all the speeches and debates in the UK House of Commons from 1995-2017 from Hansard, the official UK Parliament government archive.\(^6\) While these speeches are primarily given by Members of Parliament (MPs), we also obtained speeches by government officials, such as the Prime Minister, and other Ministers and Secretaries during their visits to the Parliament. In our sample period, the Conservative party was in power either as the leading part of a coalition with the Liberal Democratic party (5/2010-5/2015) or on its own (5/2015-5/2017). Our baseline specification includes speeches by both MPs and government officials, impacting the Conservative party. As a robustness check, we also look at only MP speeches, and the results continue to hold.

For each speech, we know the speaker and their political party affiliation. We aggregated all speeches into groups corresponding to the identity of the speaker’s political party, excluding non-partisan and procedural speeches, such as those given by the Speaker of the House and the Deputy Speakers (who are non-partisan in the UK House of Commons). We next took the sentences of all the speeches within a given political party, removed common stop words, such as “I”, “the”, “that”, and stemmed the words to their common root (thus “friend” and “friendship” are treated as the same word). We also removed procedural terms, such as "Mr. Speaker", and others that are more likely to be spoken on the House floor, but have neither political leaning nor are used by media outlets. For each political party, we counted the frequency of unigrams, bigrams, and trigrams in the entire text. For our analysis, we focused on each party’s 1,000 most frequently used words or phrases.\(^7\) To calculate the pairwise slant of each phrase we took the union of the 1,000 most common phrases of the two parties.

We turned next to the text in BBC news programs. We collected the broadcast transcripts of BBC TV News programs from 2013-2016 from Lexis-Nexis. These were available through a third party provider, TV Eyes, and its program recording was incomplete during our sample period, with the coverage improving over the four years we studied.\(^8\) As we wish to focus on news and other public

\(^5\) We therefore did not include speeches from the House of Lords.

\(^6\) https://hansard.parliament.uk/

\(^7\) Since there is large decay in frequency of word usage, it does not make a big difference if one increases the threshold to 2,000 or an even higher number of phrases. As a robustness check, we also calculated the partisan word scores of phrases using all spoken words.

\(^8\) While it is not clear how TV Eyes chose the days to record BBC News, in our analysis we assumed it was unrelated
information, we analyzed the text on programs offering news and news analysis.\textsuperscript{9}

We prepared the BBC text as we did for the political text and focused again on their top 1,000 words or phrases. We did the analysis separately for each available month between June 2013 and December 2016. To calculate the bias of BBC news transcripts, each month of BBC transcripts was matched to two months of parliamentary speeches – the current and previous months.\textsuperscript{10}

We also supplement the TV broadcasts with online BBC News articles, which are available from the Media Cloud, a news aggregator, and includes the complete list of the news broadcasts from BBC News, as found on bbc.com.

For the New York Times, we also downloaded all articles for the relevant time period from Lexis-Nexis. We then restricted the set to “UK-related” articles, meaning for the article to be considered it includes at least one of the following words: UK, Britain, British, London, England, and so on.\textsuperscript{11}

\textbf{4 Methodology}

As described in Section 2 above, there are several approaches in the existing academic literature to measure media bias. The fundamental question they answer is: what is the likelihood of assigning a person (or news program) to a political party given the text they have spoken? In this paper, we propose to use the predominant approach which compares the text used by a media entity to that used by members of political parties with identified political leanings. In particular, we follow the methodology of Laver et al. (2003) (henceforth, LBG): we identify the frequency of words and phrases used by political parties and evaluate how often they are used in Public Service Broadcasters’ news reports. The weighted average of partisan-phrase “word scores,” with weights given by the frequency of each phrase, provides our measure of bias.\textsuperscript{12} LBG approach is particularly suitable when politicians do not distinguish themselves across different legislation, but vote largely along party lines. This is a feature common in the UK, as before each vote it is the responsibility to any measured bias on those program days.

\textsuperscript{9}The set of programs considered were: The Breakfast, BBC News at One, BBC News at Six, and BBC News at Ten, that were aired on BBC One London broadcast.

\textsuperscript{10}If the Parliament was not in session in a relevant month, then we took the preceding month.

\textsuperscript{11}There are 15 such words. As mentioned, we are in progress of also incorporating major UK newspaper content.

\textsuperscript{12}Other measures, like that used by Gentzkow and Shapiro (2010), are also based on a similar approach.
of the party Whip to ensure their members do not deviate from the official party position. An additional benefit of this approach is that it can be applied across different languages, without prior knowledge of language specifics. Although there is no a priori guarantee, the phrases selected by this method make sense, and are of correct political leaning.

The Laver et al. (2003) approach starts by identifying the most popular phrases used by a political party and compares the incidence of such phrases between different parties. The most popular phrases in the speech of members of each party indicate not only the importance they place on particular issues, but also the different ways parties refer to those issues. They may also capture differences in linguistic style between parties.

For each of top 1000 phrases described in Section 3, we assign to it a value of $-1$ if it is exclusively spoken by the Labour party and a value of $+1$ if spoken exclusively by the Conservative party. If spoken by both parties, the political slant (or word score) of that phrase, $s_i$, depends on the relative incidence of use in speech by the two political parties and is given by:

$$s_i = \frac{s_{ic} - s_{il}}{s_{ic} + s_{il}},$$

(1)

where $s_{il}$ is the relative frequency of word or phrase $i$ said by Labour in their speech, and $s_{ic}$ is the relative frequency of the Conservative party.\(^{13}\)

To further illustrate this procedure, Figure 1 presents the distribution of all the relevant phrases spoken on a Labour-Conservative scale for 2015 (other years yield similar patterns). A purely Labour phrase has a word score of $-1$, whereas a purely Conservative phrase has a word score of $+1$. There is an interesting pattern for the distribution of phrases: while word scores for most phrases are normally distributed and centered around 0, there are 2 large mass points at $-1$ and $+1$. This shows two things. First, most phrases are approximately neutral; on a Labour-Conservative scale their slant is close to 0. Second, there are, however, certain words and phrases that are used exclusively by members of the Labour or Conservative parties.\(^{14}\)

The second step of the process is to calculate the slant, or bias, of a media outlet, e.g. BBC TV.

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\(^{13}\)This formula uses relative frequency rather than total counts of each phrase to account for the possibility that $l$ and $c$ have different total amounts of speech (as can happen when one party – the Conservatives – is in power and another is not).

\(^{14}\)This, in part, drives our use of phrases “pro-Labour” and “pro-Conservative” bias, indicating movement away from 0 in the direction of one political party.
Figure 1: Labour vs Conservative word slants
The bias of the outlet, $Bias_o$, is then given by the sum of the word score for each of the words it uses times their relative frequency in the outlet’s text:

$$Bias_o = \sum_{i \in o} (f_{i,o} \cdot s_i)$$  \hspace{1cm} (2)

where $f_{i,o}$ is the relative frequency of word or phrase $i$ on outlet $o$. A phrase contributes most to the bias of an outlet if that phrase has a large slant (in absolute value) and is used frequently by the outlet.

5 Results

Figure 2 presents the political slant of BBC TV news programs from 2013-2016 from our analysis. A point on the y-axis measures the average bias of the speech used in BBC news programs when measured on a Labour-versus-Conservative scale. For example, to interpret a value of 2% on the Labour-versus-Conservative line is that, in terms of BBC speech content, the BBC uses 2% more phrases used exclusively by Labour Party members than phrases used exclusively by Conservative Party members. Since most phrases are approximately neutral in slant, this measure is a potentially significant measure of bias towards Labour for the BBC news broadcasts.

BBC TV news programs have a clear, and statistically significant, pro-Labour bias relative to all other major political parties. As a robustness check, we also compared Labour to other smaller political parties in the UK, such as Scottish National Party, or Liberal Democrat. Figure 3 shows, that the pro-Labour bias in BBC news programs continues to hold, and furthermore, it is stronger relative to smaller parties. This suggests that the BBC tends to use language, words, and phrases that are uniquely associated with the Labour party. The results are robust to computing bias across different phrase lengths, and/or including government members in the political speech.  

There is one exception to the pattern: the BBC bias shifts, becoming temporarily pro-Conservative in the summer of 2015. We analyze the shift in bias in light of political events at that time. That summer followed the May 2015 election in which the Conservative party, then the lead partner in a coalition with the Liberal Democratic party – surprisingly gained 24 additional seats, earning an

15The latter would also include Liberal Democrat government speeches during their time as part of coalition government from 5/2010 to 5/2015.
Figure 2: Measure of slant in BBC Content: Labour vs Conservative
Figure 3: Measure of slant in BBC Content: Labour vs Other Parties
outright majority and control of the House of Commons. Immediately following the elections, the
Conservative party, and Prime Minister David Cameron in particular, claimed that the BBC had
provided unfair coverage of the party’s campaign and opened discussions about possible reforms
to the BBC and its funding model. So began a tumultuous time for the BBC. David Cameron
nominated John Whittingdale to the post of Secretary of State for Culture, Media, and Sport, the
agency overseeing the BBC and its operations. Mr. Whittingdale has previously been a vocal critic
of license fees, the main source of the BBC’s revenue. He had suggested eliminating such fees al-
together and forcing public broadcasters to earn revenue through advertising and subscription fees,
similar to their commercial counterparts. In July, 2015, David Cameron’s government published
the “BBC Charter Green Paper” setting out guidelines for the future of BBC. It recommended
significantly reducing its size and scope and forcing it to focus on a set of select, narrow issues.
The Green Paper also raised eliminating license fees, or sharing them with other networks. Under
significant political pressure, the BBC proposed to cut as many as 1,000 jobs, and considered for
the first time to impose license fees on residents over 75.

Our results suggest that the BBC also changed how it presented the news. In further analysis,
we confirm the robustness of the findings. Given the close proximity of May 2015 election and
the release of the “Green Paper,” we try to identify when BBC TV changed its content. As the
Conservatives won outright majority, it is possible that BBC focused more attention to their polit-
cical figures and the Conservative platform post-election. This change will also be consistent in a
demand-driven bias framework, with Conservatives being the most popular party in the election.
To identify the timing of change in BBC bias, we measure month-to-month BBC content similarity,
as:

\[
\text{Similarity}_{o,t} = \frac{\sum_{i \in o} (s_{i,o,t} s_{i,o,t-1})}{\sqrt{\sum_{i \in o} s_{i,o,t}^2} \sqrt{\sum_{i \in o} s_{i,o,t-1}^2}} \tag{3}
\]

where \( s_{i,o,t} \) is defined as before – the frequency of phrase \( i \) in media outlet \( o \) in month \( t \). Figure
4 shows, that BBC content did not change significantly in the interim period between the election
and release of “Green Paper.” After the “Green Paper” the content diverged greatly from prior
month’s coverage. The results suggest change in bias to be supply-driven, with political pressure
influencing content.

http://blogs.lse.ac.uk/mediapolicyproject/2015/07/16/bbc-charter-green-paper-unprecedented}\]
Since Public Service Broadcasters depend on governments for their revenue, they may be more sensitive to supply-side, i.e. political, influence. Our analysis sheds light on the existence and potential drivers of such bias. Documenting supply-driven bias in BBC has important policy relevance. As summarized above, without censorship or political competition, the government may capture media (Djankov et al. 2003, Besley and Prat 2006). The existing economics literature takes media bias as evidence of media capture and has identified government ownership of media, its control of regulation, and its being in charge of media revenue streams as important potential factors influencing media bias (Djankov et al. 2003). The strength of political competition (Stanig 2015), the frequency and nature of regime changes in government (VonDoepp and Young 2012), and the strength of commercial or independent media competition (Enikolopov, Petrova and Zhuravskaya 2011) are also potentially important factors. While this may be less of a concern for the UK, shifts in bias stemming from changes in political power and control could be considered a “weak” form of media capture.

6 Robustness

We conduct variety of robustness analysis to confirm our findings. We first measure bias in bbc.com platform, for the same time period. This extends the analysis beyond television news programming and analyzes BBC content for online news. The BBC’s online news content is reported by BBC worldwide journalists and published on bbc.com or bbcnews.com. While falling under the same umbrella organization, there may be differences between the BBC’s television and online news content. For one, the audience for BBC TV news is primarily in the UK, and the reported news emphasize national news and politics. We would expect political speeches from the House of Commons to be reflected in the text used in TV broadcasts. bbc.com, on the other hand, conducts not only national, but also global news gathering, and it is one of the most widely visited websites in the world for news consumption. Even though they have a dedicated UK section, the large majority of news reports have an international focus.

Figure 5 shows that while bbc.com has a noisier measure of bias along the Labour-Conservative scale, there is also a statistically significant jump in their bias reporting at the same time as BBC

Figure 4: BBC TV Similarity to Labour vs Conservative Speeches
TV. In addition, the effect is short-lived, going back to baseline level of bias, similar to BBC TV. This provides further suggestive evidence of content changing within BBC organization.

As a placebo test, we also look at the bias in the New York Times for the same time frame, along Labour-Conservative scale. We restrict attention to only “UK-related” articles in the following fashion. We include all articles that include at least one from a list of 15 predefined words, such as: UK, Britain, British, London, England, Scotland, Ireland, ... . Otherwise, the article is excluded. As Figure 6 shows, when looking at the bias of the New York Times over the same time period, we do not see the same change in bias as we do for the BBC.

We next try to uncover how the change in bias in BBC reporting came about. Using the bias formula from Equation (2), the change can come from one of two sources:
Figure 6: Measure of slant in New York Times content: Labour vs Conservative
\[ \Delta \text{Bias}_o = \sum_{i \in o} \Delta (f_{i,o} \ast s_i) \approx \sum_{i \in o} (\Delta f_{i,o}) \ast s_i + \sum_{i \in o} f_{i,o} \ast (\Delta s_i) \] (4)

This implies that bias change in the direction of pro-Conservative can be driven either by the first term or the second term. The first term specifies that BBC uses more Conservative phrases, while the second term shows using the same number of phrases, but each with higher frequency. Figure 7 shows the breakdown for each of the components before, during and after the bias change. As shown, the change in bias in BBC reporting came from the second source – BBC uses each of the unique Conservative phrases in higher proportion in their speech. The frequency increased almost four-fold and is statistically significant. Incidentally, they also used Labour phrases more frequently, showing the BBC content became more polarized during the summer of 2015.¹⁸

³Fig. 7: Bias Decomposition across words and frequencies

¹⁸The shift in the middle part of the distribution explains less than 10% of change in bias.
6.1 LDA statistical model

The above analysis focuses on how the phrases used by BBC changed over time. A media outlet may tailor its report not only how it presents the news, but to which news it decides to devote time. While news coverage is driven primarily by current events, there is discretion on how long each news segment may last. We thus look closer into topic selection and intensity in the coverage of BBC during the bias change.

We unpack the parliamentary speeches, by doing Latent Dirichlet Allocation (LDA) modeling to select the topics for the BBC. The LDA is a popular form of topic analysis, employed in computer science and linguistics, and increasingly so in social sciences. The analysis groups speeches into several topics. The innovation is that the same word may be present in different topics, and a speech may also discuss several topics. The number of topics is not specified, but in practice it is taken to be 30-100. The topics labels are not specified ex ante, but have natural interpretation. For the Parliament we took individual speeches of at least four sentences to comprise the set of documents. For BBC we specified the individual news stories as the documents to be analyzed.

Figure 8 shows the graph of the top 100 most popular topics discussed on the House of Commons floor in 2015. While the more popular topics are discussed greatly by both parties, there is significant variation within a given topic on how much time each party devotes to it. Table 9 shows the top 10 most popular topics for the Conservative and Labour parties, respectively. With LDA modeling there is no preset label for the topics. However, the words together make intuitive sense and it is not surprising to see the algorithm to select these topics for the Conservative and the Labour parties. One can confirm that the Conservatives care about and spend more time discussing national security, defense, and UK’s relation to world organizations, whereas the Labour party is more concerned with social issues, like taxes, pensions and unions.

During the summer of 2015, the breakdown of the same topics shows four topics jumping out as the Parliament devoted more attention to them, both relative to their overall 2015 baseline, and also relative to other topics. These topics can be classified as “Refugee crisis”, “Scotland devolution”, “Minimum wage,” and “Rural investment” (Figure 11), as given by their representative terms in Table 10. Among these topics, Scotland devolution and Rural investment can be classified as Conservative-leaning topics, since the Conservatives spent more than the Labour party discussing
these issues. Similarly, Refugee crisis, and Minimum wage can be classified as Labour topics.

When looking at the topic decomposition of BBC on the same set of topics, we find that BBC also devoted significantly more time to these four topics (Figure 12). Interestingly, they spent more time on the Conservative-leaning topics, than on Labour topics. This attention on more Conservative-leaning topics also helps explain the change in bias in BBC reporting.

![Figure 8: 2015 Parliamentary Topic Intensities](chart.png)

7 Conclusion

We shed light on one of the most important, and yet understudied, players in the media landscape: Public Service Broadcasters (PSBs). A central value of the BBC, the oldest and largest PSB, is to be "... independent, impartial and honest."† Many other PSBs have similar goals and mission statements. The core of our study is to comprehensively evaluate how well PSBs adhere to this

†[http://www.bbc.co.uk/corporate2/insidethebbc/whoweare/mission_and_values](http://www.bbc.co.uk/corporate2/insidethebbc/whoweare/mission_and_values)
standard by measuring whether their news broadcasts are biased and by evaluating how that bias varies across time. Understanding the answer to this question is of first-order importance for evaluating whether they are achieving their stated goals and serving the interests of all segments of their country’s population.

We also propose to shed light on the causes of such bias, if any, and whether they are demand- or supply-driven. Given the revenue structure of PSBs, a particular attention is given to supply-driven political determinants of PSB bias, which we interpret as a “weak” form of media capture. While the existing literature has largely looked at media capture in environments with limited political and commercial competition, our analysis presents evidence of media capture in robust democracies with many alternative media choices, providing important evidence regarding the independence of PSBs from political forces and the need for regulation to ensure this independence.

The media landscape has constantly evolved: from newspapers in 1800s, to radio and TV in the 20th century, and to online and social media in the past decade. This affects both content consumption and content generation. As commercial media consolidates and evolves, the importance of PSBs increases, and evaluating their reporting and accuracy becomes ever more timely.
Figure 11: Parliamentary Topics in Summer 2015
Figure 12: BBC coverage of Parliamentary Topics in Summer 2015
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