

Are Governments More Responsive to Voters in Issues They Own? A Comparative Study of the Quality of Political Representation Using Social Media Data

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Abstract

A crucial challenge in the comparative study of political representation is the lack of good measures of attention to political issues by governments and citizens. Here we develop a new approach that allows us to overcome this problem by analyzing public messages posted by citizens and legislators on social media websites in six European countries in 2014. We use topic modeling techniques to classify posts into broad policy areas, and thus obtain time series of the salience that political elites and the mass public attribute to different political issues. This enables us to study the reciprocal links between government and the public with regard to issue salience, using appropriate time series models. We examine variation in two dimensions of political representation: congruence (overlap in attention allocation between both sets of actors) and responsiveness (whether political elites respond to changes in issue attention by citizens). We hypothesize that government's agenda in countries with proportional systems is more congruent with the public agenda, but less responsive to change in citizens' preferences. We also test whether congruence is greater for issues that are owned by parties: e.g. are left-wing (right-wing) parties more congruent and responsive to voters on social (economic) issues? Our study thus contributes to previous studies of political representation by providing a new method to measure issue attention across different countries, and more generally, it improves our understanding of how elites interact with the masses in an age where communication is faster and more direct than ever before.

One of the central questions in the study of democratic politics is whether there is a positive link between citizens' preferences and the positions of their representatives (Dahl, 1973; Ezrow, 2010; Miller and Stokes, 1963; Powell Jr, 2004). From a normative perspective, the democratic process is thought to be working correctly when there is a correspondence between the policies that are implemented and an aggregation of voters' opinion (Wlezien, 1995). However, previous empirical studies find substantive variation in the magnitude of this correspondence, both across issues and countries, which appears to be systematically related to institutional characteristics and party competition dynamics (see e.g. McDonald and Budge, 2005; Soroka and Wlezien, 2010; Thomassen and Schmitt, 1997).

The goal of this paper is to examine what explains the different levels of correspondence between the issue preferences of governments, parties, and voters in different countries. To do so, we rely on a new source of data: Twitter posts published by actors of all three types. An increasing number of public officials and institutions, as well as politicians and parties, have active Twitter accounts, which they use to express policy positions and interact with voters. Similarly, citizens also make a political use of this platform by engaging in political discussions with their peers, expressing their views about current events, and reaching out to their representatives with questions and concerns. Building upon previous work by Barberá et al. (2014), we claim that Twitter messages provide an accurate representation of the importance that both sets of actors attribute to different political issues, and can thus be analyzed to measure whether the levels of correspondence between these two variables.

The contribution of this paper is also theoretical: we provide a more nuanced understanding of the effect of electoral institutions and issue ownership on the quality of political representation. On one hand, we claim that institutional settings that foster greater proportionality between votes and seats and the formation of coalition government foster greater congruence. At the same time, since this type of systems constrain executives' capacity to react to changes in the political environment, governments' capacity to be responsive to the public is hindered. We consider not only variation across countries but also across parties. In particular, we argue that parties are more responsive to voters in issues that they own, because they have an "issue reputation" to maintain (Bélanger and Meguid, 2008). Our results provide evidence in support of these three hypotheses.

Political Representation and Issue Salience

Our theoretical focus lies on what Hobolt and Klemmensen (2008) call "rhetorical responsiveness", defined as the extent to which governments and parties emphasize the same set of issues as voters in their public communication. This is of course different from "effective responsiveness" – the extent to which citizens' preferences translate into actual policy – but these two concepts are often linked. In fact, we could consider rhetorical responsiveness as a necessary but not sufficient condition for effective responsiveness, since policy actions in an issue area cannot be taken unless political representatives direct their attention to that issue (Jones and Baumgartner, 2004).

Electoral rules are often identified as the most important factor explaining cross-country variation in the quality of representation (Ezrow, 2010). Proportional electoral systems are generally thought to generate a greater correspondence between governments and voters, because usually no single party wins a majority of seats, thus leading to coalition governments with limited capacity to execute policies that most voters would disagree with (Dalton, 1985; Lijphart, 1999; Powell, 2000; McDonald and Budge, 2005).¹ Majoritarian systems, on the other hand, foster lower levels of political contestation because parties can win elections by targeting narrow groups of voters, such as voters in swing districts, and thus allows governments to make decisions less in line with majority opinion (Hobolt and Klemmensen, 2008).

The theoretical contribution in this paper is a more nuanced understanding of the relationship between institutional settings and political representation. We claim that previous studies haven't paid sufficient attention to a different characteristic of majoritarian system: they generate single-party governments with fewer veto points that thus face lower levels of political contestation (Duverger, 1959; Tsebelis, 1995), which allows them to react more quickly to changes in voters' preferences.

In our analysis, we build upon previous work by Eulau and Karps (1977) and Shor (2014) by distinguishing between two different dimensions of political representation: *political congruence* – the extent to which there is a correspondence between politicians' attention to different issues and voters' attention of the same set of issues – and *political responsiveness* – whether political elites respond to changes in citizens' attention to different issues by increasing their allocation of time to those issues. We argue that both dimensions are normatively desirable: governments should implement the policies that a majority of citizens prefer, but they should also adapt quickly to changes in voters' preferences.

This distinction is relevant because we expect system-level characteristics to have different effects on each of these dimensions. In particular, we hypothesize that:

Hypothesis 1: the level of political congruence is higher in countries with electoral rules that result in higher proportionality and with coalition governments

Hypothesis 2: the level of political responsiveness is higher in countries with electoral rules that result in lower proportionality and with single-party governments

A second contribution of our research design is the ability to measure parties' and citizens' attention to different issue areas. This allows us to explore whether the quality of political representation varies across issues. We expect some of this variation to be a function of issue ownership (Budge and Farlie, 1983; Egan, 2013; Petrocik, 1996), that is, the idea that some parties are better than others at handling particular issues (e.g. right-wing parties are more effective with national security issues), and that as a result they receive an electoral benefit when the issues they own are emphasized.

From the perspective of parties' elites, it is however not clear what their response should be whenever there is a sudden change in voters' preferences. As Egan (2009) argues, parties have

¹But see also Golder and Stramski (2010) for a different analysis that provides mixed support for this hypothesis.

incentives to be more responsive to voters' preferences in issues they do *not* own because they do not enjoy a "valence benefit" on that issue (Ansolabehere and Snyder Jr, 2000; Schofield, 2003) and thus can only compete with the other party by switching their position. At the same time, issue-owning parties may feel a responsibility to appear credible to voters on issues that they are perceived to handle more efficiently – they have an "issue reputation" to maintain (Bélanger and Meguid, 2008). We hypothesize that this is particularly so in the case of *retro* responsiveness: parties' response to changes in issue attention by the public needs to be consistent with the party's long-standing image, under the risk of damaging that reputation by not allocating sufficient attention to issues that their supporters deem as important. As a result, we hypothesize that:

Hypothesis 3: parties' level political responsiveness is higher for issues they own.

Hypothesis 3a: left-wing parties will be more responsive to voters in social issues such as education, unemployment, and the environment.

Hypothesis 3b: right-wing parties will be more responsive to voters in economic and security issues, such as taxes, crime, and immigration.

Measuring Issue Salience with Social Media Data

An important challenge in the comparative study of political responsiveness is the lack of good measures of *both* public and government issue salience across different countries. Previous studies have addressed this problem in two different ways. One approach is to compare parties and voters' estimated or self-reported positions on the left-right scale (see e.g. Ezrow, 2010; McDonald and Budge, 2005; Golder and Stramski, 2010), using a similar research design as studies of dynamic representation in the American politics literature (see e.g. Clinton, 2006). The problem of this approach is that it assumes that ideological positions are a good summary of the issues that are salient in each country, which may not necessarily be the case in most European countries, where political competition is multidimensional (Benoit et al., 2006).

A more nuanced measurement of the importance that voters attribute to different issues areas can be achieved by using the "most-important problem" question – traditionally characterized as a measure of issue salience in studies of agenda-setting (McCombs and Shaw, 1972; RePass, 1971; Soroka, 2002). However, there are some concerns about whether this question is indeed capturing meaningful variation in the public importance of each issue or simply the extent to which it is a "problem" (Wlezien, 2005). For political parties, the Comparative Manifesto Project (Volkens et al., 2011) captures parties' position along different dimensions, although only once per election cycle. A common difficulty to both of these data sources is that it is not possible to directly compare citizens' and governments' preferences as it was the case with the left-right dimension: party officials are rarely asked the "most-important problem" question in studies of elite behavior, and survey responses to issue questions do not have the same richness as party manifestos.

To overcome these measurement challenges, we propose the use of a new source of data:

social media messages sent by political actors and citizens. We focus our attention on Twitter – one of the largest social media websites in number of users and arguably where most public political communication takes place, given that most accounts are public (unlike Facebook, for example). The main advantage of this source of data is the presence of a large proportion of politicians and public institutions on this platform,² and their messages can thus be analyzed to measure the attention that *both* political actors and citizens pay to different political issues (Barberá et al., 2014). In addition, the size of this dataset allows us to conduct our analysis at different levels of temporal granularity to better capture the dynamics of political responsiveness, and not only political congruence.

We also acknowledge two important limitations in our analysis. First, Twitter users are not a representative sample of the population of a country. Second, differences in the adoption rate and use of Twitter across different countries can hinder the comparative analysis we are interested in pursuing. We claim that the advantages of using this new source of data compensate for these two potential shortcomings. Even if Twitter users are not representative, they represent an important segment of the population – the “informed electorate”, more likely to be attentive to politics and probably a good proxy for public opinion. And, as we will show in our analysis, despite the potential differences across countries, the political issues citizens discuss on Twitter are similar in nature.

Case Selection and Data Collection

In our analysis, we focus on six European countries (Denmark, France, Germany, Italy, Spain, United Kingdom) with high rates of Twitter adoption and with different institutional settings that capture the relevant variation necessary to conduct a preliminary test of our hypotheses. On one hand, Denmark, Italy, and Germany use electoral systems that results in a greater correspondence between votes and seats, and we thus expect greater congruence here than in France, with a majoritarian electoral system and a strong executive. Spain and United Kingdom are intermediate cases: Spain uses an electoral system that results in high disproportionality due to low average district magnitude and as a result has a single-party government, while the UK had a coalition government during our period of study despite using single-member districts and plurality rule. We expect the ordering of countries to be the opposite when it comes to political responsiveness. Table 1 summarizes our theoretical expectations.

For each of these countries, we prepared a list of Twitter accounts that includes (1) institutions, such as the official government account, and also the accounts of individual ministers and ministries, (2) MPs affiliated with the largest party in government, as well as the official account for this party – that is, the Social Democrats in Denmark, the CDU/CSU in Germany, the Democratic Party in Italy, PP in Spain, the Conservative Party in the UK, and the Socialist Party in France – and (3) MPs affiliated with the largest opposition party, as well as the official account for this party – Venstre in Denmark, the SPD in Germany, Forza Italia in Italy, PSOE in

²During our data collection process, we found that most governments and ministries, as well as virtually all political parties, have active Twitter accounts. Similarly, Barberá et al. (2015) show that 49% of national MPs in all 28 EU countries have Twitter accounts.

Table 1: Institutions and Political Responsiveness. Theoretical expectations.

Country	Government	Institutions	Congruence	Responsiveness
Denmark	Coalition	Proportional	High	Low
Germany	Coalition	Proportional	High	Low
Italy	Coalition	Proportional	High	Low
Spain	Single-party	Proportional	Medium	Medium
United Kingdom	Coalition	Majoritarian	Medium	Medium
France	Single-party	Majoritarian	Low	High

Spain, Labour in the UK, and the UMP in France.³ With this data collection strategy, we also have variation in our second independent variable of interest, the ideological position of the party, with one left-wing and one-right wing party in each country.

In order to measure the issues discussed by voters, we also identified a list of citizens in each country. Unfortunately, Twitter does not provide country-level information or any list of users by country and, as a result, we had to devise our own strategy to sample citizens with active Twitter accounts in each country. In particular, we collected the list of users who follow at least one of the Twitter accounts of five media outlets in each country which we selected based on their follower count (DR Breaking News, TV2 News, Politiken, DR Nyheder, Radio 24 syv in Denmark; Bild, Spiegel Eilmedungen, Spiegel Online, Stern, and Zeit in Germany; Sky TG 24, Repubblica, Corriere, Fatto Quotidiano, and Il Sole in Italy; 20 minutos, Antena 3, El Mundo, El Pais, and RTVE in Spain; 20 Minutes, Le Figaro, Le Parisien, Le Monde, and Liberation in France; BBC News, Financial Times, The Guardian, The Independent, and Sky News in the UK), and from this list sampled 5,000 accounts who (a) are not private, (b) have sent more than 10 tweets, and (c) sent their most recent tweet in the language spoken of each country.

The final step in our data collection process was to capture from Twitter’s RESTful API all the tweets sent by all types of accounts during our period of study, from January 1st 2014 to December 31st 2014. Table 2 provides a summary of our data collection process.

From Tweets to Issues

There are different ways in which we could measure attention to different political issues over time for each of these groups. One approach would be to select a set of keywords related to our issues of interest, and to just count how often they are mentioned over time. The difficulty in this approach is that constructing such list of keywords is time-consuming, requires knowledge of different languages, and almost by definition will not be exhaustive enough to include all relevant words. A different approach would be to sample tweets from this dataset, use crowd-sourcing techniques to classify them along the relevant dimensions (Benoit et al., 2014), and then use supervised learning techniques (see e.g. Hastie et al., 2009) to predict the topic to which *all* tweets in our dataset belong. However, this approach becomes expensive as

³In order to construct this dataset, we relied on the lists compiled by the politics aggregator [electionista](#), which we then revised and expanded manually to ensure they were complete.

Table 2: Dataset: summary statistics

		Gov.	Gov.Party	Opp.Party	Citizens
Denmark	Accounts	9	26	21	5,000
	Tweets	671	3,649	1,751	487,197
Germany	Accounts	36	53	75	5,000
	Tweets	17,227	23,075	26,531	810,013
Italy	Accounts	24	263	38	5,000
	Tweets	6,521	63,266	7,390	549,723
Spain	Accounts	20	62	80	5,000
	Tweets	17,054	34,568	49,910	1,234,855
UK	Accounts	42	200	196	5,000
	Tweets	40,540	105,442	130,464	682,383
France	Accounts	38	197	136	5,000
	Tweets	36,777	77,789	78,195	805,606

more countries are considered, it assumes that we can achieve high levels of accuracy in this classification task, and also has a subjective component in the selection of the relevant issues.

In our analysis, we apply unsupervised topic modeling techniques to identify the relevant political issues in each country and then measure how much they are discussed by each political group. This approach is language-agnostic, does not require subjective *a priori* judgments of what the relevant issues are, and also adapts easily to the idiosyncrasies of Twitter languages (such as hashtags, the use of the @-sign to mention other users, etc). In particular, we use Latent Dirichlet Allocation (Blei et al., 2003), a probabilistic model of word occurrences that simultaneously estimates the distribution of topics for each document (i.e. whether a set of tweets is more closely related to topic X than topic Y) and the distribution of words over topics (i.e. what clusters of words appear together more often in topic X than in topic Y).

More in detail, this model considers each document as a sequence of N words, denoted by $\mathbf{w} = (w_1, w_2, \dots, w_N)$, extracted from a vector of length V containing all possible words in the corpus. (Note that the order of words is irrelevant). LDA treats each document as a random mixture over latent topics, and each topic as a distribution over words. Each document w in the corpus is the result of the following generative model (Blei et al., 2003, p.96):

1. The topic distribution for document w is determined by: $\theta \sim \text{Dirichlet}(\alpha)$
2. The word distribution for topic k is determined by: $\beta \sim \text{Dirichlet}(\delta)$
3. For each of the words in document w
 - (a) Choose a topic $z_n \sim \text{Multinomial}(\theta)$
 - (b) Choose a word w_n from $p(w_n|z_n, \beta)$, a multinomial probability conditioned on z_n .

This model requires us to fix K , the number of possible topics. There are two main parameters of interest: β , a matrix of dimensions $K \times V$ indicating the distribution of words over topics; and θ , a matrix of dimensions $K \times N$ indicating the distribution of topics over documents.

Our definition of “documents” is the aggregated total of tweets sent by each group in any given day. In other words, the outcome of the model is a set of probabilities that can be roughly interpreted as the proportion of tweets by group i in day t that are related to topic k . This approach overcomes some of the problems of estimating to which topic each individual tweet corresponds (see e.g. [Hong and Davison, 2010](#)).

Following our previous work ([Barberá et al., 2014](#)), we divide our estimation in two stages. First, we fit the model only with tweets from political actors (government, government party, and opposition party); and second, we use the estimated parameters from the first stage to compute the topic distributions for citizens. By doing so, we ensure that the topics that emerge from the model are political in nature – the limitation of this approach is that we will not capture political topics not discussed by the set of political actors we consider.

As mentioned above, this model requires fixing K , the number of topics. To determine what value of K was adequate, we estimated our model with different numbers of topics, using 10-fold cross-validation and computing the log likelihood and estimated perplexity on the holdout sample. Figure 1 reports these two measures of model fit with 10 to 100 topics, in steps of 10 topics. In addition, we also examined whether the resulting topics in each case are semantically coherent. Both approaches suggest that approximately $K = 75$ results in a closer correspondence between the topics and relevant political issues in each country, with the exception of Denmark, where $K = 50$ appears to be more adequate.

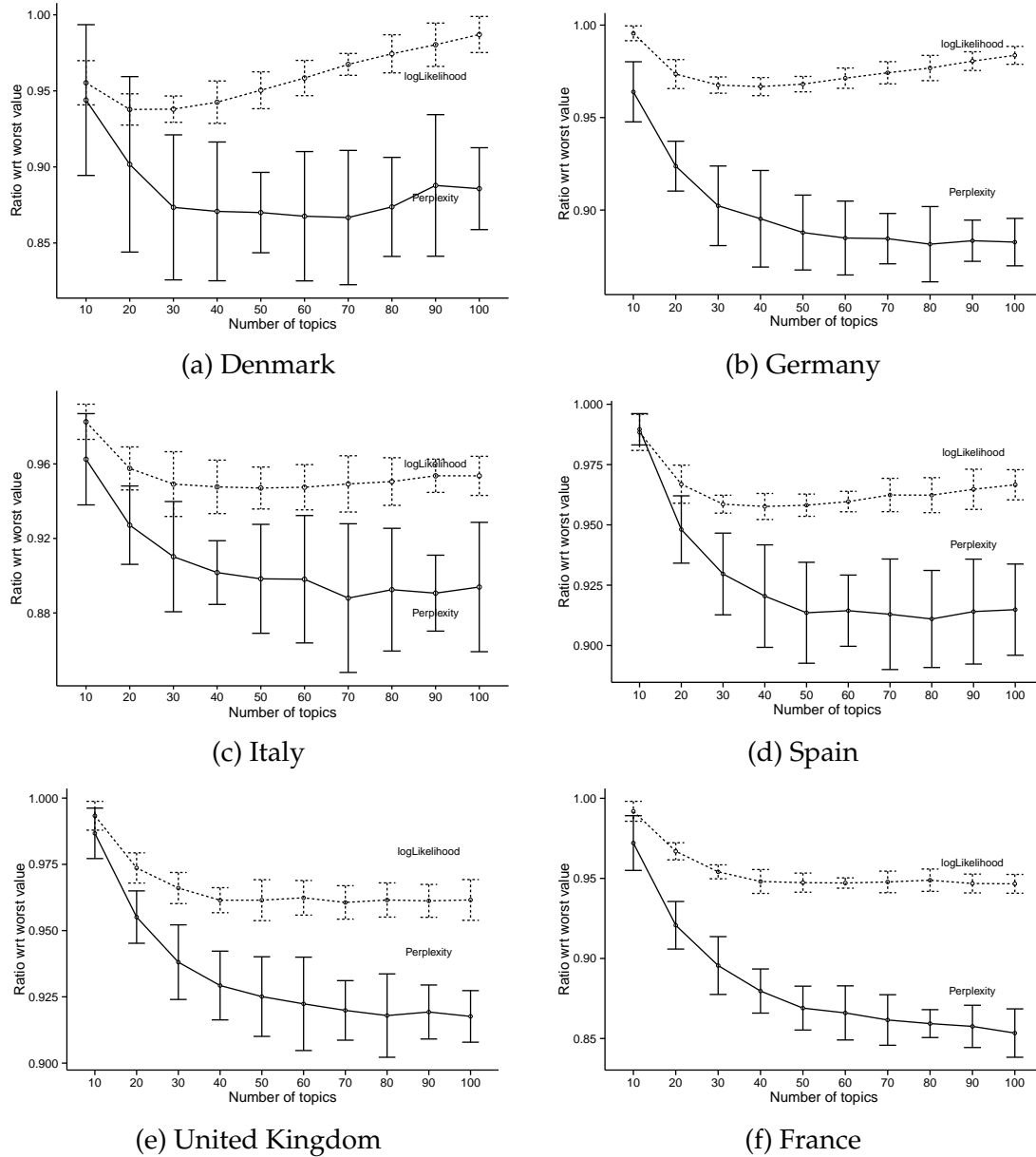
We fit the model with a collapsed Gibbs sampler ([Griffiths and Steyvers, 2004](#); [Phan et al., 2008](#)), implemented in R ([Grün and Hornik, 2011](#)). We ran a single chain for 2000 iterations. We apply the usual pre-processing text techniques (converting all words to lowercase and removing stopwords, transliteration of accentuated characters to ASCII characters, extracting unigrams and bigrams, removing all n-grams shorter than 3 characters, and all n-grams that appear in less than 5 documents and more than 90% of documents).

Validation

To facilitate the substantive interpretation of the results of the model and as a sign of research transparency, we have prepared an online appendix (or *dashboard*) where we offer a visualization of each of the topics we estimate, which we then used to assign labels to each topic. The dashboard is available in the following URL: <http://j.mp/resp-lda-demo>. We provide four different elements to judge the interpretation of each topic: a plot indicating topic use by each of the political groups, the total estimated proportion of tweets from each group that belong to this topic, a graph with the top 15 n-grams most associated with that topic, and a sample of tweets by politicians with a high probability of belong to this topic.

Figure 2 shows a screenshot from one of the topic pages in our dashboard. This topic belongs to our UK sample and we have labeled it as “unemployment numbers”. From the time series plot, we learn that it is used approximately once a month (when the unemployment number is reported), and more often by Conservative MPs than Labour MPs (not surprising,

Figure 1: LDA model fit with different number of topics

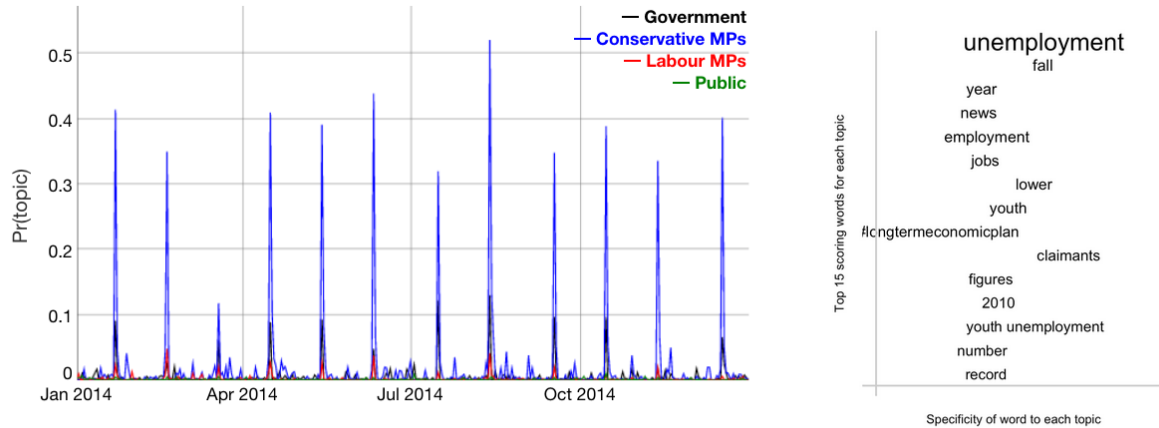


since unemployment decreased during this period), the most common n-grams are “unemployment”, “fall”, “lower”, “youth unemployment” and “#longtermeconomicplan”. The sample of tweets we show also support this interpretation.

Although not all topics have such a straightforward interpretation, in general we find that most topics that emerge from the analysis can be easily labeled. However, not all of them are political in nature: for example, a topic that appears in all four countries is related to New Year celebrations. Since we are not interested in those topics, in our analysis we will only include political topics. The only exception to this general pattern is Denmark, where find topics of low “quality”, in many cases difficult to interpret. This is possibly due to the small number of tweets available in this country (e.g. less than 700 tweets in total for government accounts). We present the results for Denmark in the rest of the paper for the sake of completeness, but with the caveat that these results should be interpreted with caution.

Figure 2: Visualization of Topics with Online Dashboard

Topic Usage Over Time:



Display: ☒ Government ☒ Conservative MPs ☒ Labour MPs ☒ Public • Smoothing period: 1 days

Topic usage by group: 0.89% all politicians, 0.53% Government, 1.94% Conservative MPs, 0.19% Labour MPs, 0.09% Public.

Sample of representative tweets by politicians:

Nicky Morgan [@NickyMorgan01](#) [Follow](#)

Today's employment figs show 680 JSA claimants in Loughborough in November-1.4% of econ active pop aged 16-64 & 364 lower than November 2013
7:53 AM - 17 Dec 2014

1 0

CCHQ Press Office [@CCHQPress](#) [Follow](#)

BIGGEST annual drop in unemployment for 26 YRS, RECORD fall in youth unemployment, RECORD number of women in work - [#LongTermPlan](#) is working
5:19 AM - 17 Sep 2014

44 6

CCHQ Press Office [@CCHQPress](#) [Follow](#)

FULL-TIME employment UP 1.3 million. RECORD fall in youth unemployment. RECORD number of women in work. [#LongTermPlan](#) is working
5:02 PM - 17 Sep 2014

21 2

Matt Hancock [@MattHancockMP](#) [Follow](#)

Over half a million more full time jobs last year - shows the long term economic plan is working, giving more families economic security
5:18 AM - 16 Apr 2014

7 1

Sajid Javid [@sajidjavid](#) [Follow](#)

Good news: Today's jobs numbers show unemployment continues to fall in [#Bromsgrove](#). Now 1.7%. Youth unemployment @ lowest level in over 5 yrs
6:38 AM - 22 Jan 2014

1 1

Kris Hopkins [@krishopkins2015](#) [Follow](#)

Biggest fall in youth unemployment since records began 30 yrs ago - [#LongTermPlan](#) is helping secure more jobs & opportunities for youngsters
4:01 PM - 13 Aug 2014

1 0

The final step in our data preparation is to classify topics according to the issue area to which they belong – this will allow us to test whether left-wing and right-wing parties vary in their degree of responsiveness according to issue ownership. In particular, we have considered four large issue domains: (1) economic policy, (2) social policy, (3) defense, security, and nationalism, and (4) European politics and foreign affairs. Table 3 displays the list of topics we have classified into each domain.

Table 3: Classification of Topics in Issue Domains

Denmark	
Econ.	(36) Budgets, promises, money, (45) Employment, new jobs
Soc.	(2) Gender equality, (17) Social dumping, (20) Schools, (43) Environmental policy
Def.	None
Intl.	(1) Foreign policy, trade, development, (3) Ukraine, Russia, Putin, (6) EU politics (tax issues), (22) Foreign aid, refugees, Syria, (30) EU, Ukraine, Russia, (40) European elections, (44) Foreign policy
Germany	
Econ.	(1) Toll on drivers (esp. foreign), (14) Business for the future, (19) Budgets, millions, euro, (52) IT, Digitalization, (66) Budget, debt
Soc.	(11) Higher education (money from Fed. Gov.), (28) Minimum wage, (35) Euthanasia, (54) Women, equality, violence, (57) Families, young, old, (68) Meeting, education, research (CDU)
Def.	(5) Armed Forces, (26) Ukraine, Russia, Crimea, (36) Pegida, (55) Foreign policy, (6) World Cup 2014
Intl.	(33) Refugees, generations, (34) EP elections, (71) Aung San Suu Kyi
Italy	
Econ.	(1) Infrastructure policy, (3) Civil service reform proposal, (7) Update on the state of the economy, (16) Speeches by Visco (Governor of the Bank of Italy), (22) "Unlock Italy" reforms, (34) Law of Economic Stability, (41) Jobs commission in Parliament, (45) Stability Law, (61) Housing taxes, (64) Economic indicators, (71) Electoral law reform and corruption, (73) Tourism
Soc.	(10) Same-sex civil unions, (21) Equality in Electoral Law, (24) "Jobs Act" and domestic violence, (25) Divorce reform, (38) Protest in Terra dei Fuochi, (59) Museums, (70) Party finances
Def.	(56) Immigration crisis, October, (63) Terrorism
Intl.	(2) Federica Mogherini nominated to High Representative of the EU, (36) Italian Presidency of the EU
Spain	
Econ.	(1) Corruption, (9) Budget, (13) Tourism, (14) Public administration reform, (22) Regional taxation, (23) Budget cuts, (25) Industrial policy, (32) Forest fire prevention, (39) Tax reform, (47) Public debt, (48) Unemployment numbers, (49) Media policy (TV), (63) Intellectual property reform
Soc.	(3) Education policy, (8) Long-term unemployment, (42) Domestic violence, (43) Disability policy, (50) Abortion reform, (53) Museums, (57) Church-state relations
Def.	(10) Citizen safety law, (20) Terrorism, (38) Coronation of Felipe VI, (45) Catalonia, (61) Armed forces
Intl.	(2) European elections (election day), (52) Foreign policy analysis, (60) European commission, (65) EP election debate, (66) Visit of Michelle Bachelet, (70) Ebola, (72) Ceuta border crisis.
United Kingdom	
Econ.	(14) Housing (home ownership), (18) Budget (economic aspects), (20) Bedroom tax, (24) Unemployment numbers, (35) Osborne's Autumn Statement (Economy), (45) Economic growth, (59) High Speed 2 (railway), (71) Small business
Soc.	(2) Badger culling (for health reasons), (7) Housing (rent increases), (39) Housing benefits, (51) 0.7% Foreign aid, (60) #costofcameron campaign, (62) Environment, Food, and Rural Affairs, (69) Minimum wage, (72) Budget (social aspects), (73) Women's issues
Def.	(1) Immigration and EU, (5) Remembrance day (end of WWI), (21) Armed Forces, (22) World Cup, (27) World War I Centenary, (32) Knife crime law, (65) Child abuse inquiry, (67) Public safety
Intl.	(9) Ebola, (11) European elections, (23) EU referendum, (31) Israel and Gaza, (49) Ukraine crisis, (56) Iraq and ISIS
France	
Econ.	(10) Budget, (43) Tax code simplification, (45) Stability program (public finances), (48) Energy policy, (55) Budget, (74) Rail transportation reform
Soc.	(1) World Aids Day, (7) Libraries, (8) Conference on environment, (12) Family allowances, (22) Energy and environment, (26) Domestic violence, (32) Abortion, (35) Museums, (37) Education policy, (38) Euthanasia, (47) Equality law, (63) Paris climate summit
Def.	(6) Penal reform, (19) World Cup, (56) World War I centenary
Intl.	(18) Palestine recognition, (61) Killing of Herve Gourdel (terrorism), (70) European elections, (71) Hostages in Syria, (75) Crimea and Ukraine

Note: *Econ.* corresponds to economic policy, *Soc.* corresponds to social policy, *Def.* corresponds to defense, security, and nationalism, and *Intl.* corresponds to European politics and foreign affairs. The topic numbers are the same as in our online appendix (<http://j.mp/resp-lda-demo>), and are provided here to facilitate readers' interpretation.

Results

Congruence

We start with the question of whether political actors and the public generally emphasize the same issues, which we refer to as congruence. To assess this, we leave the time dimension aside, and focus on correspondence across topic usage, by averaging the scores for each topic and each set of actors across the whole year. Because a few topics are considerably more frequently used than others, we log the resulting averages to get more normally distributed data. Using these data, Table 4 shows bivariate correlations (Pearson’s r) between the scores of the public, and those of the government, main governing party, and main opposition party.

For the government, we find a notable positive relationship in Germany, a weaker positive relationship in the UK, and notably negative relationships in Italy, Spain, and France. This is generally in line with the expectations outlined in Table 1 above. The only exceptions are Italy and Denmark, where contrary to our expectations we find low levels of congruence, but these differences could be due to the composition of the government in Italy (mostly composed by PD politicians) and the lower quality of the topic modeling results in Denmark. Looking at the governing and opposition parties, however, the pattern is less clear. Although we did not have any particular expectations regarding parties’ congruence with citizens’ allocation to different issues, the results appear to suggest congruence is higher for parties that were successful at setting the public agenda during 2014, such as the UMP in France, PP in Spain or Labour in the UK.

Table 4: Correlations of Issue Priorities (Political Issues)

	Government	Gov Party	Opposition
Germany	.306	-.333	.044
UK	.173	-.020	.053
Denmark	-.169	-.276	.283
Italy	-.349	.056	-.049
Spain	-.365	.042	-.005
France	-.429	-.241	.520

Note: The entries are bivariate correlations between the (logged) average issue priorities of the respective actors and the public for the year of 2014, sorted from lowest to highest government congruence.

Responsiveness

We now turn to the question of whether political elites respond to the public, which we refer to as responsiveness. Here we focus on the time-related variance that was left aside in the previous analysis, and leave aside between-topic variance. To analyze the potentially reciprocal relationships between the public and elites we thus use topic-fixed effects in a panel-variant of a vector autoregressive (VAR) model. To capture auto-regressive patterns and lagged effects we use a generous 7-lag structure, where the last lag helps to account for any weekly fluctua-

tions.⁴ If we let $\Phi_{i,j,t}$ contain the data for group i and topic j , at time t , our model for a given country can be expressed as:

$$\Phi_{i,j,t} = \alpha_j + \sum_i \sum_{p=1}^7 \beta_{i,p} \Phi_{i,j,t-p} + \varepsilon_{i,j,t} \quad (1)$$

The results from these models can best be expressed using the implied impulse response functions (IRFs). Figure 5 in the Appendix shows cumulative orthogonalized IRFs (COIRFs) for the responsiveness of governments and governing parties in our six countries of interest. These impulse response functions indicate how a one unit increase in public attention to a given topic influences the attention of the other actors over time (cumulatively). To facilitate the interpretation of our results, here we report standardized cumulative IRFs, measured in standard deviation changes, after 15 days (see Table 5 and Figure 3).

Table 5: COIRFs: Governmental Responsiveness to the Public in Issue Salience

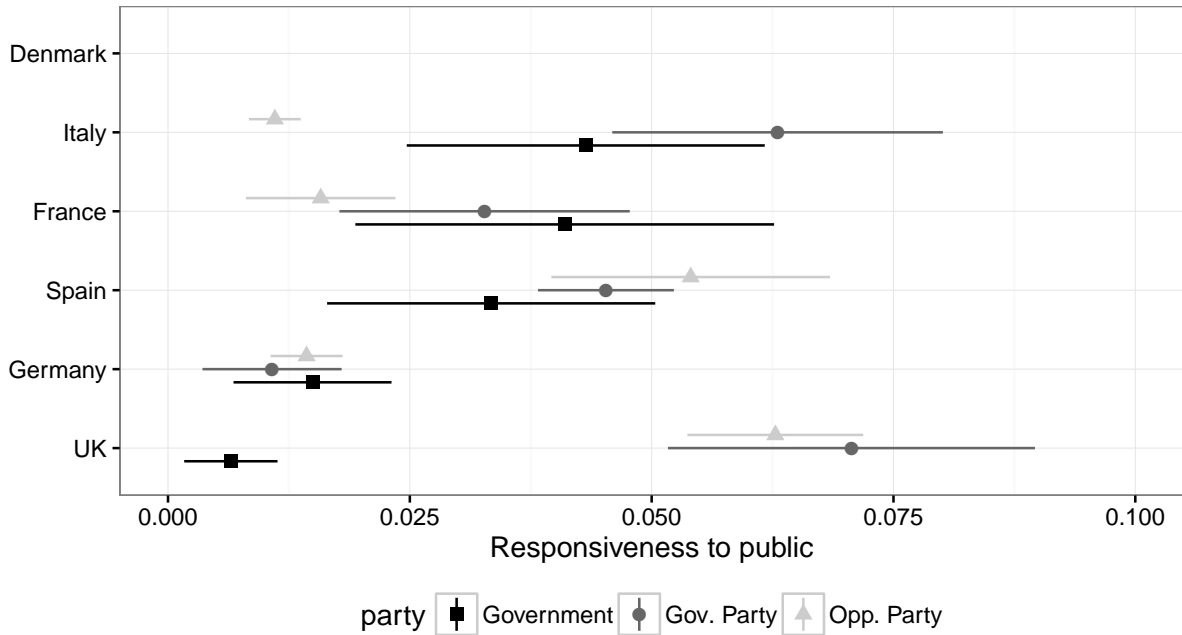
	Government	Gov Party	Opposition
UK	.006 (.002)	.071 (.009)	.063 (.005)
Germany	.015 (.004)	.011 (.004)	.014 (.002)
Spain	.033 (.008)	.045 (.004)	.054 (.007)
France	.041 (.011)	.033 (.008)	.016 (.004)
Italy	.043 (.009)	.063 (.009)	.011 (.001)
Denmark	.646 (.789)	-1.86 (.731)	-3.03 (2.75)

Note: The entries indicate the cumulative predicted change in the issue salience of political topics for each group (in the columns), measured in fraction of a standard deviation of each variable, as a result of a one-standard-deviation increase in issue salience by public. Rows are sorted from lowest to highest government responsiveness.

Our results provide partial support for our hypotheses. As we expected, we find high levels of responsiveness in France. A one-standard-deviation increase in public attention has a cumulative effect of around 5% of a standard deviation in the topic distribution for the government. The magnitude of this effect is lower in countries with coalition governments, such as the UK and Germany. Here we also offer results for the main party in government and the main opposition party, which we find to be more responsive in most cases, perhaps because parties are less constrained than institutions to adapt their public positions in response

⁴Diagnosing this model, we face the challenge that our high number of observations will tend to make most test diagnostics show significant violations, even when these are very small – and thus would appear insignificant in most other models. In specifying our models, we thus have to rely more on assessment of the extent of the potential violations than their according p-values. Considering partial auto-correlation functions for the variables in question, these correlations tend to drop quickly, and become very weak after the seventh lag. We thus use AR(7) models, which generally should be more than sufficient.

Figure 3: COIRFs: Governmental Responsiveness to the Public in Issue Saliency



Note: coefficients for Denmark are not displayed due to large magnitude compared to the other countries.

to changes in public preferences.

Finally, in order to test our second hypothesis, we also compute our models after subsetting our dataset by the type of topics: economic issues or social issues. As earlier, Figure 6 in the Appendix displays the cumulative orthogonalized IRFs for the responsiveness of government and opposition parties in our six countries of interest, while Table 6 and Figure 6 in the main text display the standardized cumulative IRFs, measured in standard deviation changes, after 15 days.

Generally, we do not find large differences across parties but those that appear to be significant are all in the expected direction: the PP is more responsive to voters on economic issues than the PSOE in Spain, whereas PSOE is more responsive on social issues; the Conservative party is more responsive on economic issues than Labour, whereas Labour is more responsive on social issues; and the PS is more responsive to voters on social issues than the UMP in France. The only significant different that runs contrary to our expectation concerns our estimates of responsiveness of the PD on economic issues in Italy. However, this difference could be explained by the fact that the Renzi government emphasized improving the state of the economy as one of its most important goals.

Discussion

What explains the extent to which governments and parties pay attention to the same sets of political issues that citizens consider relevant? In this paper we examine this question by relying on a new source of data – Twitter posts published by both political actors and citizens.

Table 6: COIRFs: Government versus Opposition Responsiveness to the Public in Issue Salience on Economic and Social Issues

Issues:	Government Party		Opposition Party	
	Economy	Social	Economy	Social
Right-wing single-party governments				
Spain	.040 (.006)	.023 (.002)	.016 (.005)	.038 (.016)
Coalition governments led by right-wing parties				
UK	.044 (.023)	.017 (.003)	.018 (.007)	.049 (.008)
Germany	.018 (.004)	.006 (.010)	.012 (.002)	.012 (.003)
Coalition governments led by left-wing parties				
Italy	.077 (.011)	.009 (.016)	.014 (.002)	-.000 (.003)
Denmark	.000 (.000)	-.000 (.000)	.000 (.000)	-.000 (.000)
Left-wing single-party governments				
France	.054 (.016)	.073 (.010)	.033 (.007)	.024 (.005)

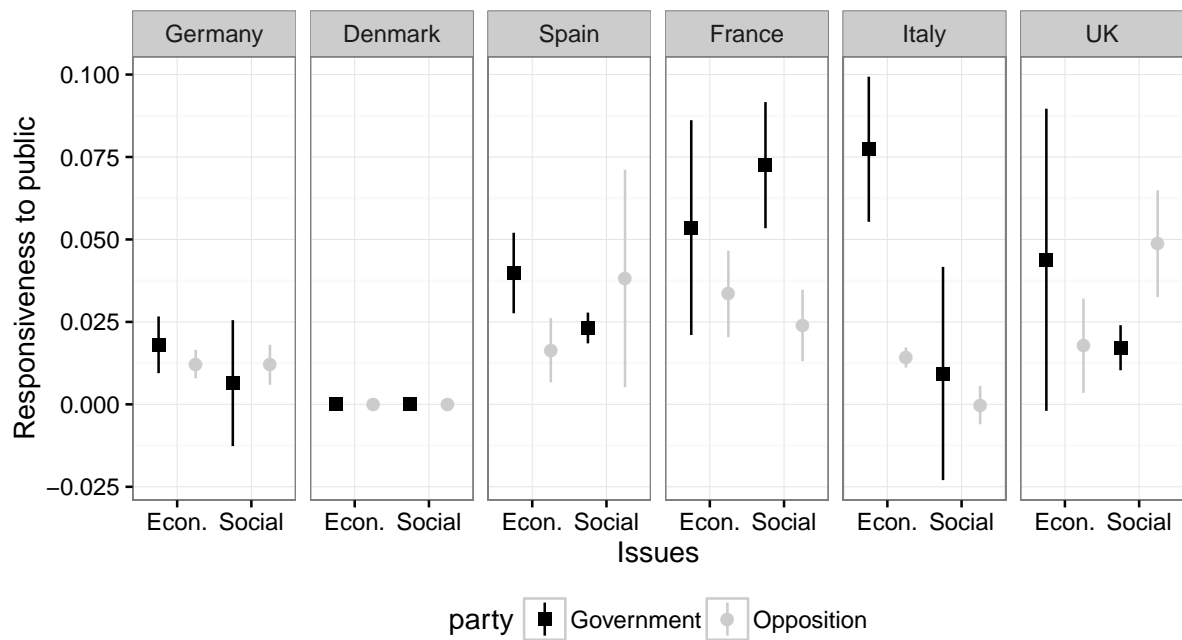
Note: The entries indicate the cumulative predicted change in the issue salience of political topics for each group (in the columns), measured in fraction of a standard deviation of each variable, as a result of a one-standard-deviation increase in issue salience by public.

We show that this dataset provides reliable measures of issue salience across different groups that can bring more nuance to the study of political representation. Building upon previous literature, we argue that country-level institutional characteristics and party-level issue ownership affects the extent to which there is an overlap between the public agenda and the political (congruence) and whether changes in one after the other (responsiveness).

Our results provide new evidence in support of a somewhat paradoxical effect of electoral institutions. On one hand, institutional settings that foster greater proportionality between votes and seats and the formation of coalition government foster greater congruence. At the same time, however, it also constrains executives' capacity to react to changes in the political environment and thus hinders responsiveness. We are also interested in examining variation across different parties. Our results provide support for the hypothesis that parties are more responsive to voters in issues that they own.

Although future research is needed in order to unpack the results of our analysis, we believe it highlights the exciting possibilities of social media data to conduct comparative studies of political behavior and to contribute to our understanding of democratic processes.

Figure 4: COIRFs: Government versus Opposition Responsiveness to the Public in Issue Salience on Economic and Social Issues



References

- Ansolabehere, S. and Snyder Jr, J. M. (2000). Valence politics and equilibrium in spatial election models. *Public Choice*, 103(3-4):327–336.
- Barberá, P., Bonneau, R., Egan, P., Jost, J. T., Nagler, J., and Tucker, J. (2014). Leaders or followers? measuring political responsiveness in the us congress using social media data. *Prepared for the 2014 Annual Meeting of the American Political Science Association*.
- Barberá, P., Popa, S. A., and Schmitt, H. (2015). Prospects of ideological realignment(s) in the 2014 ep elections? analyzing the common multidimensional political space for voters, parties, and legislators in europe. In *MPSA Conference 2015*.
- Bélanger, É. and Meguid, B. M. (2008). Issue salience, issue ownership, and issue-based vote choice. *Electoral Studies*, 27(3):477–491.
- Benoit, K., Conway, D., Lauderdale, B. E., Laver, M., and Mikhaylov, S. (2014). Crowd-sourced text analysis: Reproducible and agile production of political data. *American Political Science Review*.
- Benoit, K., Laver, M., et al. (2006). *Party policy in modern democracies*. Routledge.
- Blei, D. M., Ng, A. Y., and Jordan, M. I. (2003). Latent dirichlet allocation. *the Journal of machine Learning research*, 3:993–1022.
- Budge, I. and Farlie, D. (1983). *Explaining and predicting elections: Issue effects and party strategies in twenty-three democracies*. Taylor & Francis.
- Clinton, J. D. (2006). Representation in congress: constituents and roll calls in the 106th house. *Journal of Politics*, 68(2):397–409.
- Dahl, R. A. (1973). *Polyarchy: participation and opposition*. Yale University Press.
- Dalton, R. J. (1985). Political parties and political representation party supporters and party elites in nine nations. *Comparative Political Studies*, 18(3):267–299.
- Duverger, M. (1959). *Political parties: Their organization and activity in the modern state*. Methuen.
- Egan, P. (2009). Issue ownership and representation in the united states: A theory of legislative response to constituency opinion. Technical report, Working paper. New York University.
- Egan, P. J. (2013). *Partisan priorities: How issue ownership drives and distorts American politics*. Cambridge University Press.
- Eulau, H. and Karp, P. D. (1977). The puzzle of representation: Specifying components of responsiveness. *Legislative Studies Quarterly*, pages 233–254.
- Ezrow, L. (2010). *Linking citizens and parties: How electoral systems matter for political representation*. Oxford University Press.

- Golder, M. and Stramski, J. (2010). Ideological congruence and electoral institutions. *American Journal of Political Science*, 54(1):90–106.
- Griffiths, T. L. and Steyvers, M. (2004). Finding scientific topics. *Proceedings of the National academy of Sciences of the United States of America*, 101(Suppl 1):5228–5235.
- Grün, B. and Hornik, K. (2011). topicmodels: An r package for fitting topic models. *Journal of Statistical Software*, 40(13):1–30.
- Hastie, T., Tibshirani, R., and Friedman, J. (2009). *The elements of statistical learning*. Springer.
- Hobolt, S. B. and Klemmensen, R. (2008). Government responsiveness and political competition in comparative perspective. *Comparative Political Studies*, 41(3):309–337.
- Hong, L. and Davison, B. D. (2010). Empirical study of topic modeling in twitter. In *Proceedings of the First Workshop on Social Media Analytics*, pages 80–88. ACM.
- Jones, B. D. and Baumgartner, F. R. (2004). Representation and agenda setting. *Policy Studies Journal*, 32(1):1–24.
- Lijphart, A. (1999). *Patterns of Democracy. Government Forms and Performance in Thirty-Six Countries*. Yale University Press, New Haven, CT.
- McCombs, M. E. and Shaw, D. L. (1972). The agenda-setting function of mass media. *Public opinion quarterly*, pages 176–187.
- McDonald, M. D. and Budge, I. (2005). *Elections, Parties, Democracy: Conferring the Median Mandate: Conferring the Median Mandate*. OUP Oxford.
- Miller, W. E. and Stokes, D. E. (1963). Constituency influence in congress. *American political science review*, 57(01):45–56.
- Petrocik, J. R. (1996). Issue ownership in presidential elections, with a 1980 case study. *American journal of political science*, pages 825–850.
- Phan, X.-H., Nguyen, L.-M., and Horiguchi, S. (2008). Learning to classify short and sparse text & web with hidden topics from large-scale data collections. In *Proceedings of the 17th international conference on World Wide Web*, pages 91–100. ACM.
- Powell, G. Bingham, J. (2000). *Elections as Instruments of Democracy. Majoritarian and Proportional Visions*. Yale University Press, New Haven.
- Powell Jr, G. B. (2004). Political representation in comparative politics. *Annu. Rev. Polit. Sci.*, 7:273–296.
- RePass, D. E. (1971). Issue salience and party choice. *American Political Science Review*, 65(02):389–400.
- Schofield, N. (2003). Valence competition in the spatial stochastic model. *Journal of Theoretical Politics*, 15(4):371–383.

- Shor, B. (2014). Congruence, responsiveness, and representation in american state legislatures. *Available at SSRN 1697352*.
- Soroka, S. N. (2002). Issue attributes and agenda-setting by media, the public, and policymakers in canada. *International Journal of Public Opinion Research*, 14(3):264–285.
- Soroka, S. N. and Wlezien, C. (2010). *Degrees of Democracy: Politics, Public Opinion, and Policy*. Cambridge University Press, Cambridge.
- Thomassen, J. and Schmitt, H. (1997). Policy representation. *European Journal of Political Research*, 32(2):165–184.
- Tsebelis, G. (1995). Decision making in political systems: Veto players in presidentialism, parliamentarism, multicameralism and multipartyism. *British journal of political science*, 25(03):289–325.
- Volkens, A., Lacewell, O., Lehmann, P., Regel, S., Schultze, H., and Werner, A. (2011). The manifesto data collection. Manifesto Project (MRG/CMP/MARPOR), Berlin: Wissenschaftszentrum Berlin für Sozialforschung (WZB).
- Wlezien, C. (1995). The public as thermostat: Dynamics of preferences for spending. *American Journal of Political Science*, 39(4):981–1000.
- Wlezien, C. (2005). On the salience of political issues: The problem with ‘most important problem’. *Electoral Studies*, 24(4):555–579.

Additional Figures

Figure 5: Governmental Responsiveness to the Public by Country

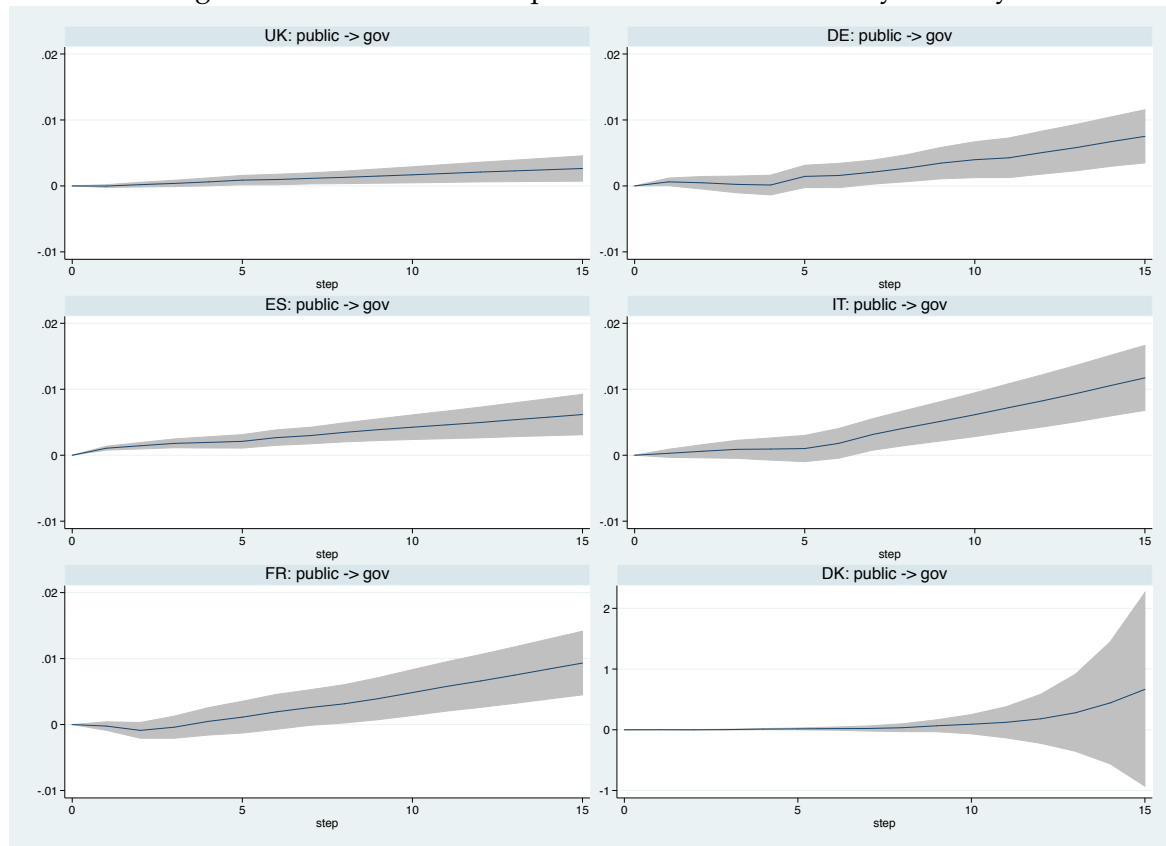


Figure 6: Government versus Opposition Party Responsiveness on Economic and Social Issues

