

Party Polarization and Bill Cosponsorship in European Parliaments

goo.gl/VcEmXT

In recent years, the ties that Members of Parliament (MPs) create by cosponsoring legislation together have attracted interest from scholars adopting a network approach to lawmaking. This paper expands the empirical base of these studies by introducing an original dataset of 150 bill cosponsorship networks that cover 27 parliamentary chambers from 19 European countries, plus Israel. We then use the data to model the amount of partisan divisiveness found in the networks while controlling for the number of parliamentary factions, thereby providing an empirical test of Giovanni Sartori's classical distinction between the fragmentation of a party system and the degree of polarization between its components. In line with Sartori's observations, the results show that inter-party ideological distance predicts some of the partisanship expressed by MPs through their propensity to cosponsor bills within and across party lines, regardless of the number of MPs and parties involved.

Theoretical background

Party polarization

- **Median voter theorem** and spatial models (Downs 1957)
- **Complete, transitive, single-peaked preferences** over issue sets (P & R 1997)
- **Partisan supply** of ideologically committed representatives (Mayhew 1974)

Bill cosponsorship

- **Policy ties** between parliamentarians (Alemán and Calvo 2013)
- **Position-taking device** aimed at constituents (Koger 2003)
- Proxy for **party discipline** (Desposato, Kearney and Crisp 2011)

Legislative cosponsorship

Data

- **Type of items:** amendments, bills, votes... and sponsors, i.e. MPs
- **Legislative document properties:** date of introduction, votes, keywords...
- **Sponsor (MP) attributes:** age, gender, parliamentary group, career...

Analytics

- **Units of reference:** parliamentary chamber, individual MPs
- **Classical measurements:** productivity, efficiency (likelihood of adoption)
- **Relational measurements:** ties between MPs and/or between chambers

Comparative framework

National parliaments

- Lower and upper **chambers**
- National or federal **sponsors**

E.g. **Switzerland**: National Council, Council of States

Private (MP) bills

- **Legal constraint** in case of adoption
- **Nominal, individual signatures** (sponsorships)

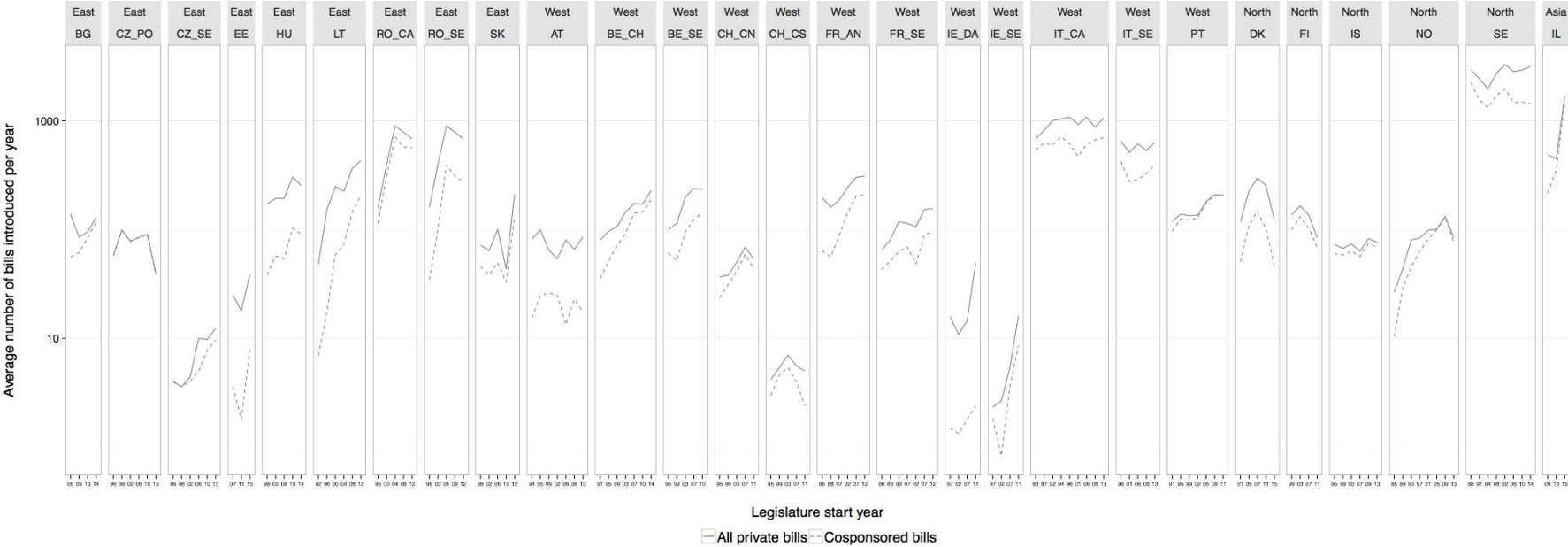
E.g. **France** : parliamentary group sponsorships

Network patterns of legislative collaboration in twenty parliaments

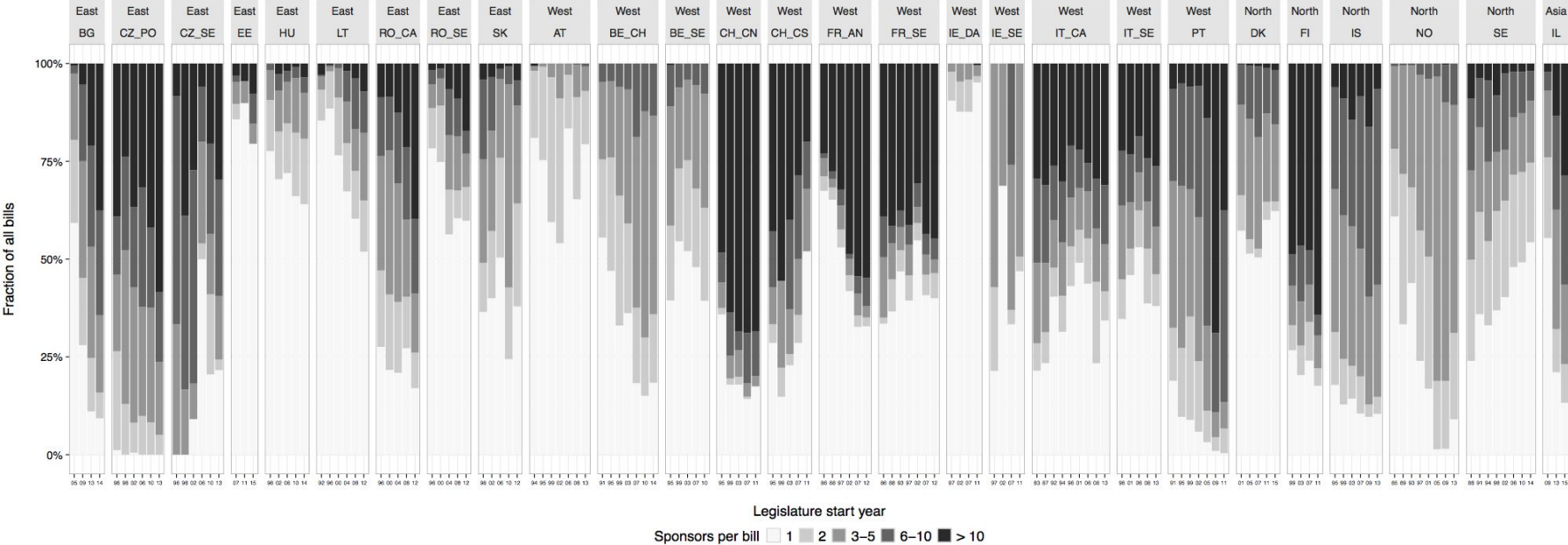
Region	Country	Chamber	Period	Years	Legislatures
East	Bulgaria	Unicameral	2005–2015	11	4
	Czech Republic	Lower	1996–2015	20	6
		Upper	1996–2015	20	6
	Estonia	Unicameral	2007–2015	9	3
	Hungary	Unicameral	1998–2015	18	5
	Lithuania	Unicameral	1992–2015	24	6
	Romania	Lower	1996–2015	20	5
		Upper	1996–2015	20	5
	Slovakia	Unicameral	1998–2015	18	5
	West	Austria	Lower chamber only	1994–2015	22
Belgium		Lower	1991–2015	25	7
		Upper	1995–2014	20	5
France		Lower	1986–2015	25*	6
		Upper	1986–2015	30	7
Ireland		Lower	1997–2015	19	4
		Upper	1997–2015	19	4
Italy		Lower	1983–2015	33	9
		Upper	1996–2015	20	5
Portugal		Unicameral	1991–2015	25	7
Switzerland	Lower	1995–2015	21	5	
	Upper	1995–2015	21	5	
North	Denmark	Unicameral	2001–2015	15	5
	Finland	Unicameral	1999–2014	16	4
	Iceland	Unicameral	1995–2015	21	6
	Norway	Unicameral	1985–2015	31	8
	Sweden	Unicameral	1988–2015	28	8
Asia	Israel	Unicameral	2009–2015	7	3

*Missing legislature 10 (1993–1997) of the French lower chamber.

Number of bills (yearly averages)



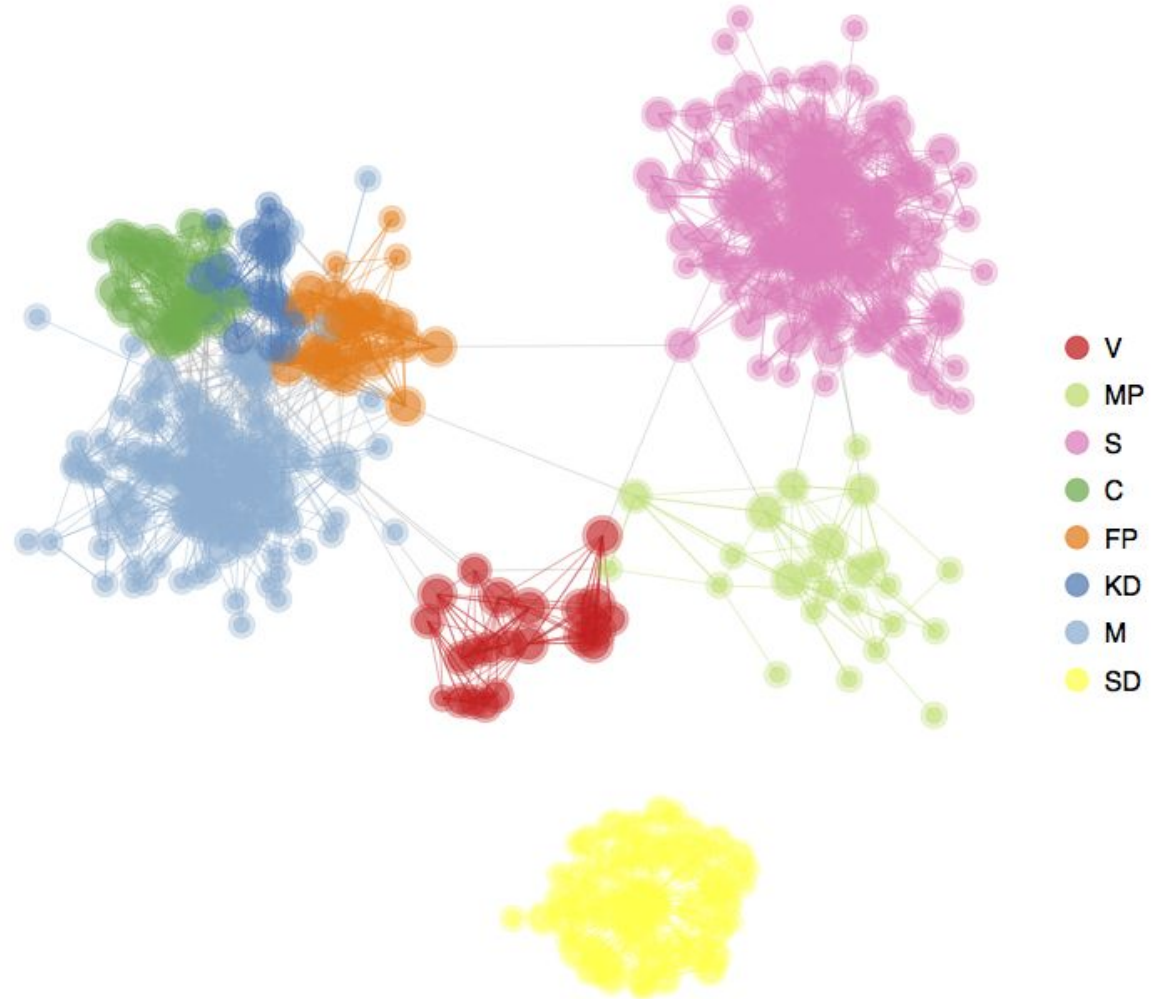
Bills cosponsored (grey levels)



Network characteristics / 1

All networks are **collapsed two-mode** networks that connect the **first authors** of cosponsored bills to their **cosponsor(s)**.

Each network represents a **single country, chamber and legislature**.



Riksdag, 2014–

Network characteristics / 2

Edge construction

- **Find directed ties** between first author and cosponsor(s) of each bill
- **Aggregate ties over all bills** introduced in the legislature

Result: edges that represent **'raw counts' of shared cosponsorships**

Edge weighting

- **Normalize by the number of sponsors per bill** (Newman-Fowler weights)
- **Further normalize by the productivity of the first author** (Gross-Shalizi)

Result: edges that represent the **weighted propensity to cosponsor** together

Newman-Fowler edge weights

The equation that we implement is given in Gross, Kirkland and Shalizi (2012, eqn. 1, p. 8). Letting $c_{j(k)}$ denote the number of cosponsors on MP j 's k^{th} bill, the strength of the tie between MP j and every cosponsor i on the bill is first weighted to $1/c_{jk}$, in order to downplay the influence of bills that are cosponsored by large numbers of MPs. At that stage, each first author is connected to each of his or her cosponsors by the sum of these weights, defined as

$$W_{ij} = \sum_{k=1}^{n_j} \frac{Y_{ij(k)}}{c_{j(k)}} \quad (\text{E1})$$

Gross-Shalizi edge weights

The next step consists in dividing these weights, which Fowler (2006a, p. 468) calls the “weighted quantity of bills cosponsored”, by the maximum value that they reach when MP i is a cosponsor on every k^{th} bill by MP j . The resulting weights, which Gross, Kirkland and Shalizi (2012, p. 8) call the “weighted propensity to cosponsor” and which we refer to as ‘Gross-Shalizi weights’ in reference to an earlier version of the manuscript by the two authors, are defined as

$$WPC_{ij} = \frac{\sum_{k=1}^{n_j} \frac{Y_{ij(k)}}{c_{j(k)}}}{\sum_{k=1}^{n_j} \frac{1}{c_{j(k)}}} \quad (\text{E2})$$

Model characteristics / 1

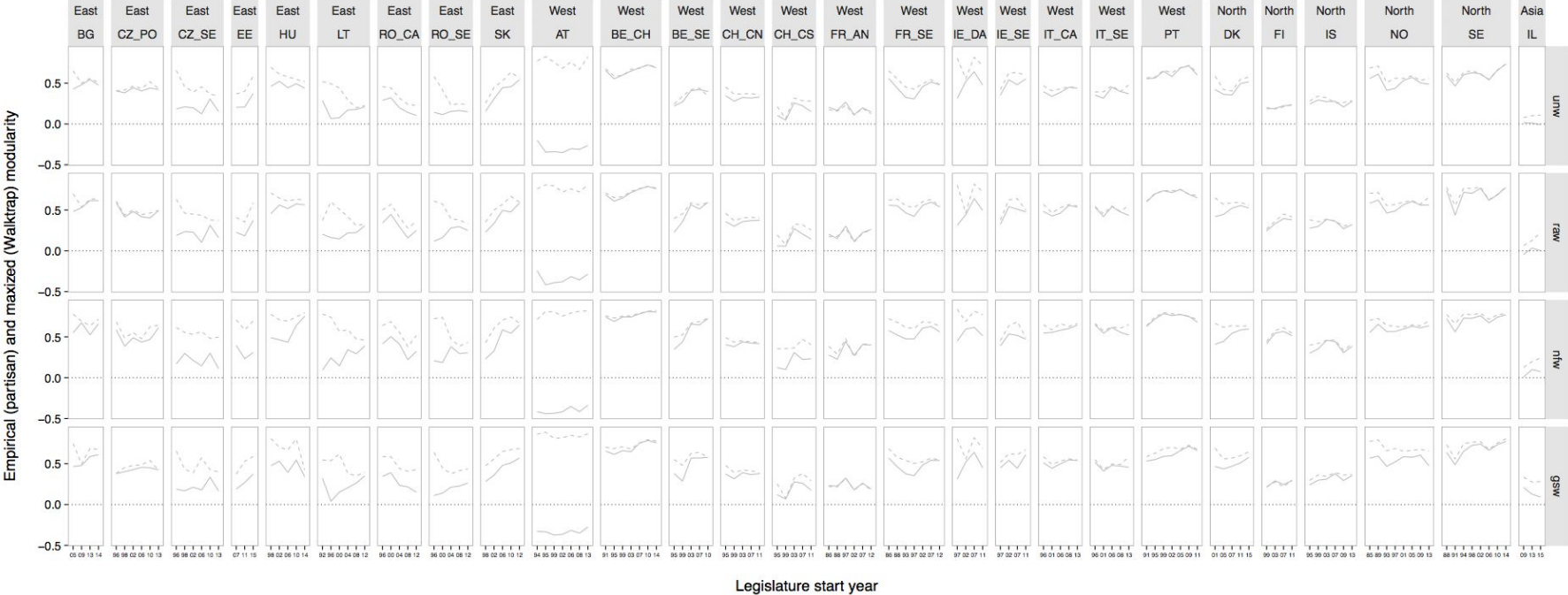
Dependent variable

- **Network modularity:** likelihood of within-group assortativity
- **In partisan terms:** intra-party collaboration v. inter-party collaboration
i.e. **chamber segmentation** with regards to bill cosponsorship

Characteristics

- Bounded between **-1 and +1**
 - 1: all ties are between MPs of *different* party groups
 - +1: all ties are between MPs of *the same* party group
- Sensitive to **network size** and **density**

Network modularity (all measures)



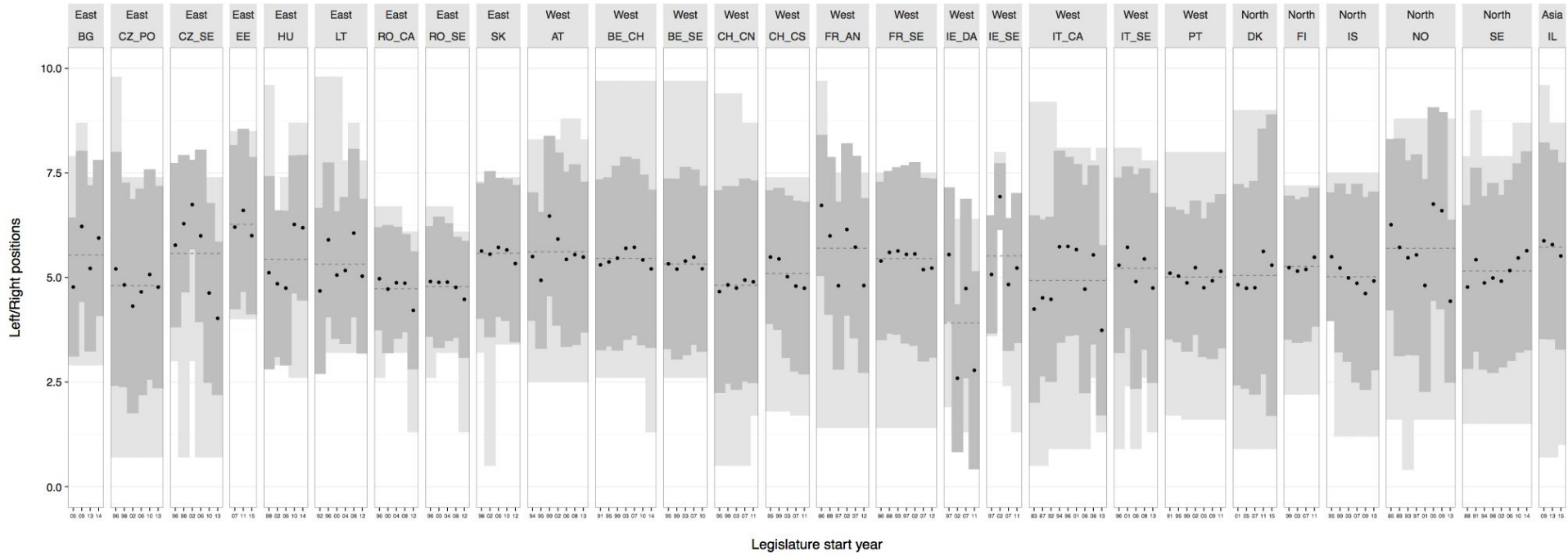
Model characteristics / 2

Independent variables

- **Chamber structures:** nb. of sponsors, nb. and median size of party groups
- **Sponsor composition:** % female, % newly elected, % unaffiliateds
- **Parliamentary committees:** nb. and mean size of committees
- **Legislature duration** (to control for *some* temporal, i.e. duration, effects)
- **Cosponsorship activity:** nb. of bills, network density
- **Partisan composition:** mean ParlGov Left/Right score and standard deviation

Network modularity ~ Ideological dispersion + controls

Ideological dispersion (Left/Right)



	W1	W2	W3	W4
Intercept	0.31 (0.16)	0.26 (0.16)	0.15 (0.15)	0.10 (0.15)
Number of parties	-0.01 (0.00)	-0.01 (0.00)	-0.01 (0.00)	-0.01 (0.00)
Number of bills / 1000	0.02 (0.01)	0.02 (0.01)	0.01 (0.01)	0.01 (0.01)
Number of sponsors / 100	0.02* (0.01)	0.02 (0.01)	0.01 (0.01)	0.01 (0.01)
Network density	-2.18*** (0.34)	-2.23*** (0.34)	-2.02*** (0.30)	-2.09*** (0.31)
Left/Right party positions (mean)	-0.01 (0.02)	-0.00 (0.02)	0.01 (0.02)	0.02 (0.02)
Left/Right party positions (s.d.)	0.08* (0.04)	0.08* (0.04)	0.11*** (0.03)	0.11*** (0.03)
% female sponsors	0.00*** (0.00)	0.00*** (0.00)	0.00* (0.00)	0.00* (0.00)
% newly elected sponsors	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
% unaffiliated sponsors	0.00* (0.00)	0.00* (0.00)	0.00 (0.00)	0.00 (0.00)
Legislature duration (years)	-0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Parliamentary committees (number)			0.00 (0.00)	0.00 (0.00)
Parliamentary committees (mean size)			0.00** (0.00)	0.00** (0.00)
<i>N</i>	139	137	116	114
Adjusted R ²	0.41	0.40	0.58	0.57
Residual standard deviation	0.14	0.13	0.11	0.11

In recent years, the ties that Members of Parliament (MPs) create by cosponsoring legislation together have attracted interest from scholars adopting a network approach to lawmaking. This paper expands the empirical base of these studies by introducing an original dataset of 150 bill cosponsorship networks that cover 27 parliamentary chambers from 19 European countries, plus Israel. We then use the data to model the amount of partisan divisiveness found in the networks while controlling for the number of parliamentary factions, thereby providing an empirical test of Giovanni Sartori's classical distinction between the fragmentation of a party system and the degree of polarization between its components. In line with Sartori's observations, the results show that inter-party ideological distance predicts some of the partisanship expressed by MPs through their propensity to cosponsor bills within and across party lines, regardless of the number of MPs and parties involved.

Thank you for your attention

francois.briatte@sciencespo.fr

Data collection

Appendix 1

Network patterns of legislative collaboration in twenty parliaments

Region	Country	Chamber	Period	Years	Legislatures	
East	Bulgaria	Unicameral	2005–2015	11	4	
	Czech Republic	Lower	1996–2015	20	6	
		Upper	1996–2015	20	6	
	Estonia	Unicameral	2007–2015	9	3	
	Hungary	Unicameral	1998–2015	18	5	manual input required
	Lithuania	Unicameral	1992–2015	24	6	
	Romania	Lower	1996–2015	20	5	
		Upper	1996–2015	20	5	
Slovakia	Unicameral	1998–2015	18	5		
West	Austria	Lower chamber only	1994–2015	22	7	truncated data
	Belgium	Lower	1991–2015	25	7	
		Upper	1995–2014	20	5	
	France	Lower	1986–2015	25*	6	
		Upper	1986–2015	30	7	
	Ireland	Lower	1997–2015	19	4	
		Upper	1997–2015	19	4	
	Italy	Lower	1983–2015	33	9	
		Upper	1996–2015	20	5	
	Portugal	Unicameral	1991–2015	25	7	
Switzerland	Lower	1995–2015	21	5		
	Upper	1995–2015	21	5		
North	Denmark	Unicameral	2001–2015	15	5	
	Finland	Unicameral	1999–2014	16	4	broken scraper
	Iceland	Unicameral	1995–2015	21	6	
	Norway	Unicameral	1985–2015	31	8	
	Sweden	Unicameral	1988–2015	28	8	
Asia	Israel	Unicameral	2009–2015	7	3	

*Missing legislature 10 (1993–1997) of the French lower chamber.

Problem

1. **Data availability** far from systematic

... with **many data formats and/or collection methods** depending on sources

- Official parliament websites
- 'Open data' portals (official or not)

2. **Limited literature** on data collection

... even though **incentives to publish raw data** are on the rise

- in funding applications
- in research assessments



The collective action of data collection: A data infrastructure on parties, elections and cabinets

Holger Döring

Universität Bremen, Germany

Abstract

Here, I introduce a novel approach towards data collection for comparative research and present a new data infrastructure on parties, elections and governments, the **Parliament and Government Composition Database (ParlGov)**. This data infrastructure combines a **database, data presentation in webpages and software scripts** in order to generate more dynamic datasets and to facilitate cooperation. So far, it includes information about more than **1000 parties, around 600 elections** (national and European Parliament) and almost **1000 governments with their party composition**. These observations are linked to a wide set of information about party positions and make it possible to derive various datasets for studies in political science. To provide a first glance into the potential of this new data infrastructure, I map the political space of the European Union (EU) by drawing on this source.

Methods

1. Scraping

1.1. Data on **private bills**

1.2. Data on **sponsors**

























Note: **non-automated dumps** – no automatic data updates like scrapers written in Python or Ruby on Morph.io

2. Networks

2.1. **Standardized variables** extraction

2.2. **Construction and visualisation** of cosponsorship networks

Note: **limited standardisation** – some attributes of sponsors and/or bills are hardly comparable between countries

 althing @ b84d007	Iceland: scraper 2015 update
 assembleia @ 4196d58	Portugal: bugfixes
 belparl @ cb9d7a1	Belgium: avoid missing file failure
 bgparl @ 1f99775	Bulgaria: bugfixes
 eduskunta @ a8e666c	fix %%e% indexation issue
 folketinget @ dabac85	Denmark: minor bug
 kneset @ 1b56ac7	Israel: bugfix
 nationalrat @ a729e0e	Austria: more data, cleaner code
 nrsr @ 76c84b2	compatibility with rvest 0.3.0 (further updates)
 oireachtas @ 691f811	Ireland: bugfix
 orszaggyules @ 2026aab	Hungary: December 2015 update
 parlament @ e8dac0c	Poland: bugfix
 parlamento @ 9adf9ac	Italy: final party details
 parlamentul @ ecc97a5	Romania: minor fixes
 parlement @ 8b27eb4	France: bugfixes
 riigikogu @ 85fe2a7	Estonia: fixes to sponsors data
 riksdag @ 83e3762	Sweden: bugfixes
 seimas @ c026249	Lithuania: final details
 stortinget @ e970986	Norway: scraper 2015 update
 swparl @ cadc9ff	Switzerland: bugfixes
 .gitmodules	add Estonia: submodule and repo init
 HOWTO.md	HOWTO: additional package dependency
 README.md	README: typo in links to Korea
 parlnet.csv	bugfix in Italy 1996 measures



github.com/briatte/parlnet

1. one submodule per country

– replication code

– network data

– codebook and notes

2. additional documentation

– network measures

– links to article preprints

– link to raw data dump

Scraping

• Download

- `utils::download.file`
- `httr::GET`
- `psql` # interfaced with dplyr via RPostgreSQL

• Parsing

- `rvest::read_html` # `xml2::read_html`
- `rvest::read_xml` # `xml2::read_xml`
- `jsonlite::fromJSON`
- `XML` # replaced by `xml2` + `rvest`

```

4 root = "http://www.althingi.is"
5 bills = "data/bills.csv"
6 sponsors = "data/sponsors.csv"
7
8 ▼ if (!file.exists(bills)) {
9
10 b = data_frame()
11 for (i in 145:119) { # accepts down to 20 (1907)
12
13 cat(sprintf("%3.0f", i))
14
15 f = paste0("raw/bill-lists/bills-", i, ".html")
16
17 if (!file.exists(f))
18 download.file(paste0(root, "/thingstorf/thingmalalistar-efrir-thingum/lagafrumvorp/?lthing=", i), f,
19 quiet = TRUE, mode = "wb")
20
21 h = read_html(f) %>% html_nodes("#t_malalisti")
22
23 n = html_nodes(h, "td:nth-child(1)") %>% html_text
24
25 ▼ if (!length(n)) {
26
27 cat(": no bills\n")
28
29 } else {
30
31 ▼ b = rbind(b, data_frame(
32 session = i,
33 ref = n,
34 date = html_nodes(h, "td:nth-child(2)") %>% html_text,
35 title = html_nodes(h, "td:nth-child(3)") %>% html_text,
36 url = html_nodes(h, "td:nth-child(3) a") %>% html_attr("href"),
37 author = html_nodes(h, "td:nth-child(4)") %>% html_text,
38 authors = html_nodes(h, "td:nth-child(4) a") %>% html_attr("href")
39 ))
40
41 cat(":", sprintf("%5.0f", nrow(b)), "total bills\n")
42
43 ▲ }
44
45 ▲ }
46
47 b$author = str_clean(b$author)
48 b$date = as.Date(strptime(b$date, "%d.%m.%Y"))
49 b$n_au = NA
50
51 write.csv(b, bills, row.names = FALSE)
52
53 ▲ }

```

1. download raw HTML files

to back them up later

2. parse HTML and get variables

using **CSSSelect** or **XPath**

3. save to intermediary CSV file

to save time on re-run

Networks

● Construction

- `base::expand.grid` # create (directed) edges
- `base::aggregate` # add edge weights
- `network::network` # object of class 'network'

● Attributes

- `sna::degree` # centrality
- `tnet::degree_w` # weighted centrality
- `igraph::modularity` # modularity

```

17 edges = lapply(unique(data$authors), function(d) {
18
19   w = au$name[ au$authors == d ] # sponsor list is ordered
20
21   d = expand.grid(i = w, j = w[1], stringsAsFactors = FALSE)
22
23   return(data.frame(d, w = length(w) - 1, stringsAsFactors = FALSE)) # number
   of cosponsors
24
25 }) %>% bind_rows
26
27 # =====
28 # EDGE WEIGHTS
29 # =====
30
31 # first author self-loops, with counts of cosponsors
32 self = subset(edges, i == j)
33
34 # count number of bills per first author
35 n_au = table(self$j)|
36
37 # remove self-loops from directed edge list
38 edges = subset(edges, i != j)
39
40 # count number of bills cosponsored per sponsor
41 n_co = table(edges$i)
42
43 # identify directed ties
44 edges$ij = apply(edges[, 1:2 ], 1, paste0, collapse = "///")
45
46 # raw edge counts
47 raw = table(edges$ij)
48
49 # Newman-Fowler weights (weighted quantity of bills cosponsored)
50 edges = aggregate(w ~ ij, function(x) sum(1 / x), data = edges)
51
52 # expand to edge list
53 edges = data_frame(i = gsub("(.)///(.)", "\\1", edges$ij),
54                   j = gsub("(.)///(.)", "\\2", edges$ij),
55                   raw = as.vector(raw[ edges$ij ]), # raw edge counts
56                   nfw = edges$w)
57
58 # Gross-Shalizi weights (weighted propensity to cosponsor)
59 edges = merge(edges, aggregate(w ~ j, function(x) sum(1 / x), data = self))
60 edges$gs = edges$nfw / edges$w
61
62 # sanity check
63 stopifnot(edges$gs <= 1)

```

1. build directed edge list
(possibly redundant)

2. compute edge weights
(see paper appendix)

3. verify edge weights
(non-redundant)

Data visualization

Appendix 2

Visualization

- **Static**

- **Idiosyncratic syntaxes:** `igraph`, `network`, `sna`
- **ggplot2 syntax:** `geomnet`, `ggraph`, `ggnet`, `ggnetwork`
see github.com/sctyner/ggnet-paper

- **Interactive**

- **With R + d3.js:** `networkD3`, `ndtv`
- **With Gephi:** `GEXF` format # exportable with `rgexf`
- **With JavaScript + PHP:** `Sigma` # reads GEXF

Each network shows bill cosponsorships in the Hungarian Parliament.

All networks are directed graphs drawn with the [Fruchterman-Reingold](#) force-directed algorithm. The ties connect the first author of each bill to the cosponsors of that bill. The nodes are sized by [unweighted total degree](#). When two nodes belong to the same group, any existing tie between them is given the color of that group. There is a [guide to party codes and colors](#) at the end of this page.

See the [interactive visualization](#), or view [other countries](#).

1998–2002



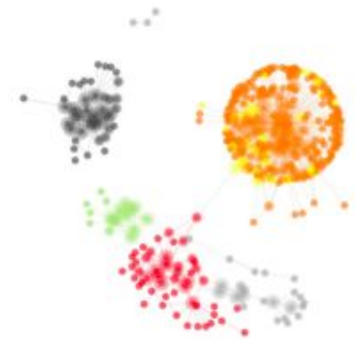
2002–2006

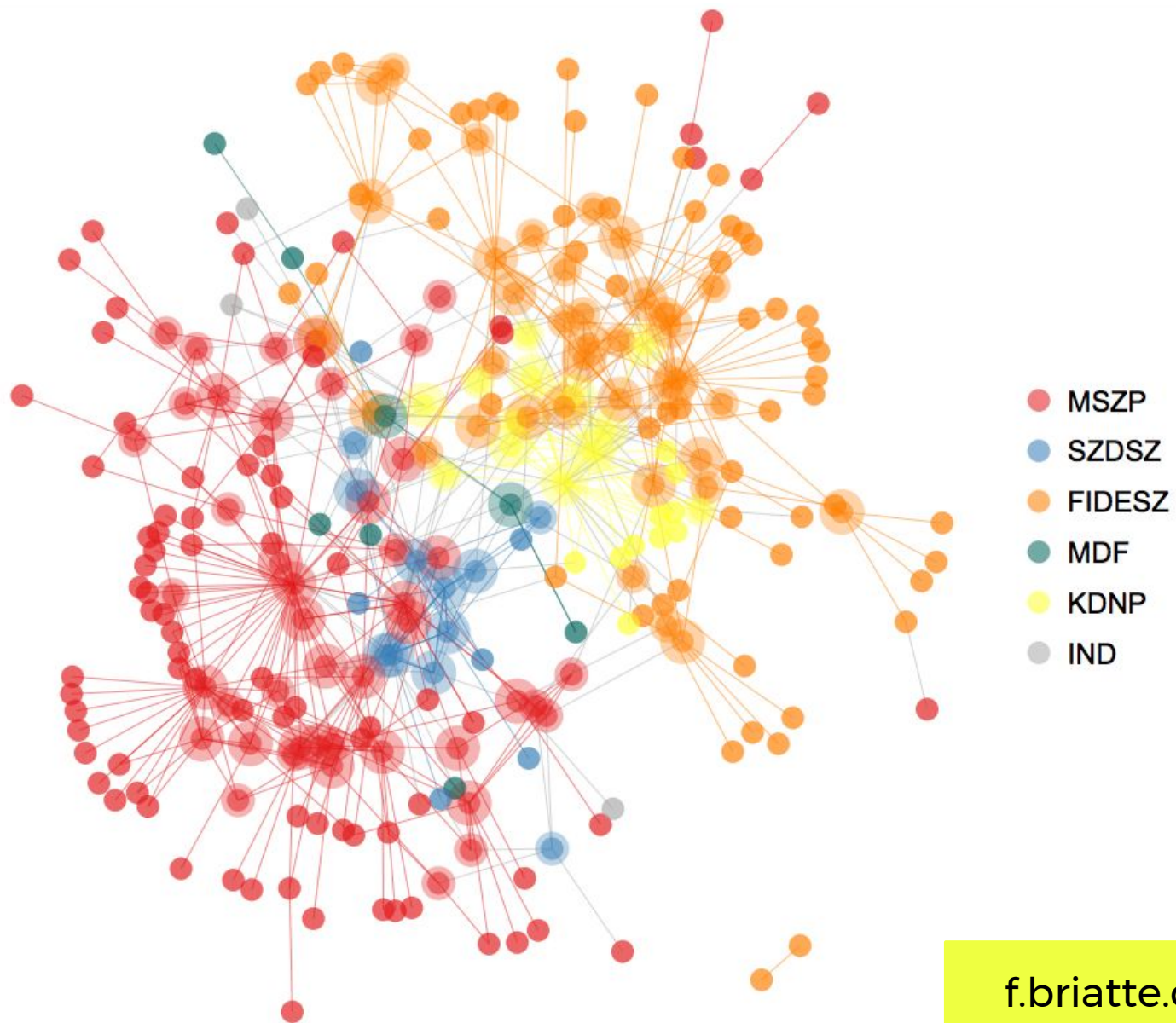


2006–2010



2010–2014





HUNGARIAN PARLIAMENT

Országgyűlés, 2002—2006

Legislature 1998—2002 2002—2006

2006—2010 2010—2014 2014—

Search

Click a node to show its ego network.

Double click the graph to zoom in.

Hide Edges Labels Weak ties

RESET ZOOM

ANIMATE

TWEET

CODE

Data from parlament.hu (winter 2015)

Download network full series plots

MORE NETWORKS

This graph shows Hungarian Members of Parliament (MPs) during years 2002—2006. A link between two MPs indicates that they have cosponsored at least one bill together.

DETAILS

The network is based on 286 cosponsored bills. It contains 713 directed edges that connect the first author of each bill to its cosponsor(s). The 297 nodes are sized proportionally to their **unweighted total degree**.

Group colors Magyar Szocialista Párt
Szabad Demokraták Szövetsége Fidesz –
Magyar Polgári Szövetség Magyar Demokrata Fórum
independent

f.briatte.org/parlviz

Summary of workflow

