Appendices

A   Descriptive Statistics

The corpus contains over 500 millions words spread across 3.5 million speeches made by 3,425 Members between 1901 and 2015 (see Table A1). Note that in all of the analyses, we removed speeches made by the Speaker of the House. Figure A1 illustrates the distribution of the number of words used in each of these speeches. The mean document length across this period is 153 words, and there is an average 274 speeches per sitting days of the House. Assuming a rate of 120-140 words per minute, this corresponds to interventions of approximately 66-77 seconds, on average. Thus, the bulk of these speeches are very short and contain only a handful of words, such as "throw him out" or "try the truth." In fact, more than half of all recorded speeches have fewer than 47 words. Only around nine per cent of those could be considered longer than two minutes (more than 260 words). Of course, calculating the length of speech with this method has its limits, especially if the speaker is interrupted often, for example by the phrase "hear, hear." In this case, the database reports the interruption as its own document, thus separating an intervention in two or more observations. One method to get around this problem is to cluster all of the speeches made by a member on a specific topic in a single day to measure how a member may have spoken on the same issue. Although not perfect, this approach allows us to measure how long a member might have spoken on a single topic. Without surprise, this confirms that the mean length of individual clustered speeches is around 508 words (3-4 minutes), while the median speech length is now 137 words (1 minute).

Table A1: Descriptive statistics of the entire corpus of parliamentary speech data (Lipad)

Number of MPs	3,425
Number of Speeches	3,533,578
Number of Words	541,472,609
Number of Sitting days	12,898
Average Number of Speeches Per Day	274
Average Number of Words Per Speech	153

We can also look at how the length of speeches has changed over time by counting the

number of words spoken by all members during the debates in a given year—or, alternatively, by looking at the annual sum of interventions over time. For the following analyses, we looked at the data annually or by parliamentary terms, and removed debates prior to the 11th parliament because almost two years of data—22 November 1906 to 20 July 1908— are missing. The two plots of Figure A2 report these statistics. For this analysis, the interventions are not lumped together by speakers or topics of debates at this point. One intervention corresponds to one entry in the dataset. In both cases, we see an increase in the length and number of legislative speeches from the end of World War II to the mid-1970s, when the annual number of words spoken reached about six million and the number of interventions around forty thousand. After this point, there is a decrease in the number of interventions per year, but not in the number of spoken words, which appears to have leveled off for the rest of the period.

Of course, both of these measures could be influenced by the number of members sitting in the House, as well as the number of sitting days during a session. But weighting the data by the number of sitting days and the total number of MPs confirm these previous trends. Figure A3 shows the same values, weighted by the product of 1) the maximum number of annual sitting days in a given year ($\frac{x}{197}$) and 2) the maximum total number of MPs in a given year ($\frac{y}{414}$). This analysis confirms that the period ranging from 1950 to 1975 saw a marked increase in parliament activities, both in terms of the length of speeches and the number of interventions, even if the number of MPs in the House of Commons grew by more than 15 per cent between 1975 and 2015 (264 to 308).
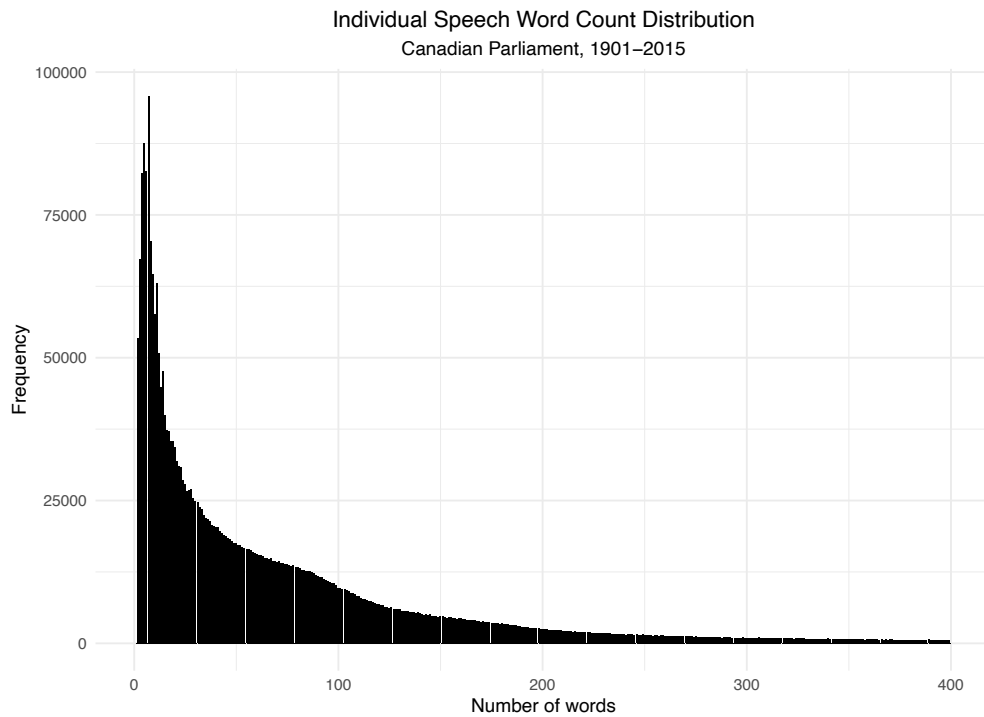
Figure A1: This Figure reports the distribution of the number of words (censored at 400 words) in speeches made in the House of Commons between 1901-2015.
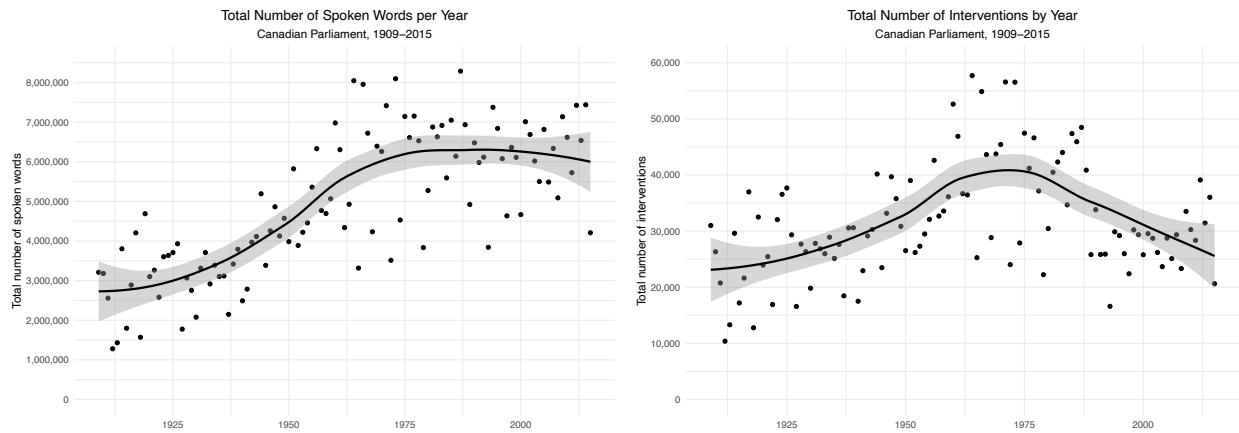

Figure A2: The two plots report the annual number of words (left) and interventions (right) in the House of Commons since 1909. The lines are loess curves fitted locally on the x axis ($\alpha = .75$)
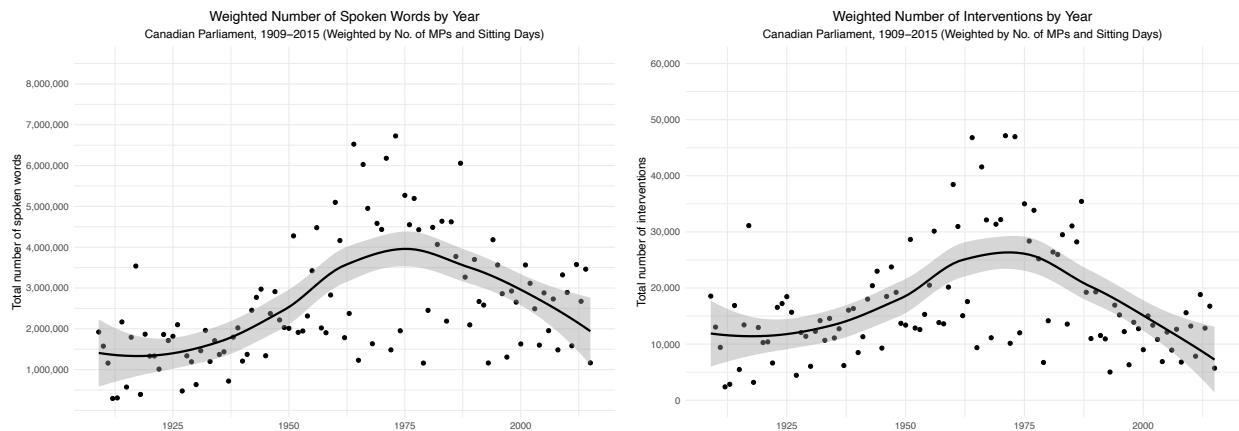
Figure A3: The two plots report the number of words (left) and interventions (right) weighted by the number of sitting days and the number of MPs. The lines are loess curves fitted locally on the x axis ($\alpha = .75$).

B The Effect of MP Position on Speech Patterns, Aggregate Results

Columns 1.1 and 1.2 in Table B1 report the results of a linear regression model where the dependent variable is the natural logarithm of the total number of words spoken by a member in a given term, and the main independent variable is his/her position in the house. The member can either sit on the back- or front-bench of the opposition, or be a government backbencher (the reference category is government frontbenchers). Model 1.1 includes parliament fixed-effects, and model 1.2 includes individual member fixed-effects. Columns 1.3 and 1.4 report a poisson regression model where the dependent variable is the total number of interventions by each member in a given term.

The first set of results confirm that being in the front-bench of the opposition is associated with a greater amount of legislative speaking time. It is interesting to note that being a backbencher from the opposition—but not the government—is also correlated with more speaking time, when compared to government frontbenchers. In fact, both specifications of the first model confirm that government backbenchers speak the fewest words in parliament. This is the case when we compare members within a parliament (model 1.1), or when we

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Table B1: Effect of a member's position on the length of legislative speeches (1.1-1.2) or the number of interventions (1.3-1.4).

	1.1	1.2	1.3	1.4
Intercept	9.94***	9.30***	6.78***	5.81***
	(0.11)	(0.98)	(0.00)	(0.04)
Gov. Back-bench	−1.31***	−0.78***	−2.21***	−1.40***
	(0.05)	(0.05)	(0.00)	(0.00)
Opp. Back-bench	0.24***	0.20***	−0.54***	−0.20***
	(0.05)	(0.05)	(0.00)	(0.00)
Opp. Front-bench	0.39***	0.20**	0.42***	0.21***
	(0.09)	(0.10)	(0.00)	(0.00)
Parliament Fixed Effects	✓		✓	
MP Fixed Effects		✓		✓
Num. obs.	9543	9543	9543	9543

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Standard errors in parentheses.

The dependent variable in models 1.1-1.2 is the natural logarithm of the total number

of words spoken by a member in a given term. The dependent variable in models 1.3-1.4

is the total number of interventions by each member in a given term.

look at promotions or demotions across a legislative career (model 1.2). Turning now to our second model (1.3-1.4), we find that sitting on the front-bench of the government or the opposition is associated with more interventions. This finding is not surprising as members of the front-bench are more likely to be solicited during the debates. These results demonstrate again that government backbenchers have the lowest number of interventions, both within parliament (models 1.1-1.3) and across individual legislative careers (models 1.2-1.4).

This last finding is important because it confirms that government backbenchers have the least amount of influence through legislative speech. Of course, there are some limits with this type of analysis. By aggregating speeches by member and by parliament, we lose granularity in the data. To overcome this problem, we unpacked these sums in the paper and presented the dis-aggregated findings in Figure 1 of the main text.

C   Choice of STM number of topics

In topic modeling, there is no "right" number of topics. We selected 35 topics because it reached a good compromise between exclusivity and semantic coherence. Figure C1 reports these two statistics for 15 to 45 topics (by increments of 5).
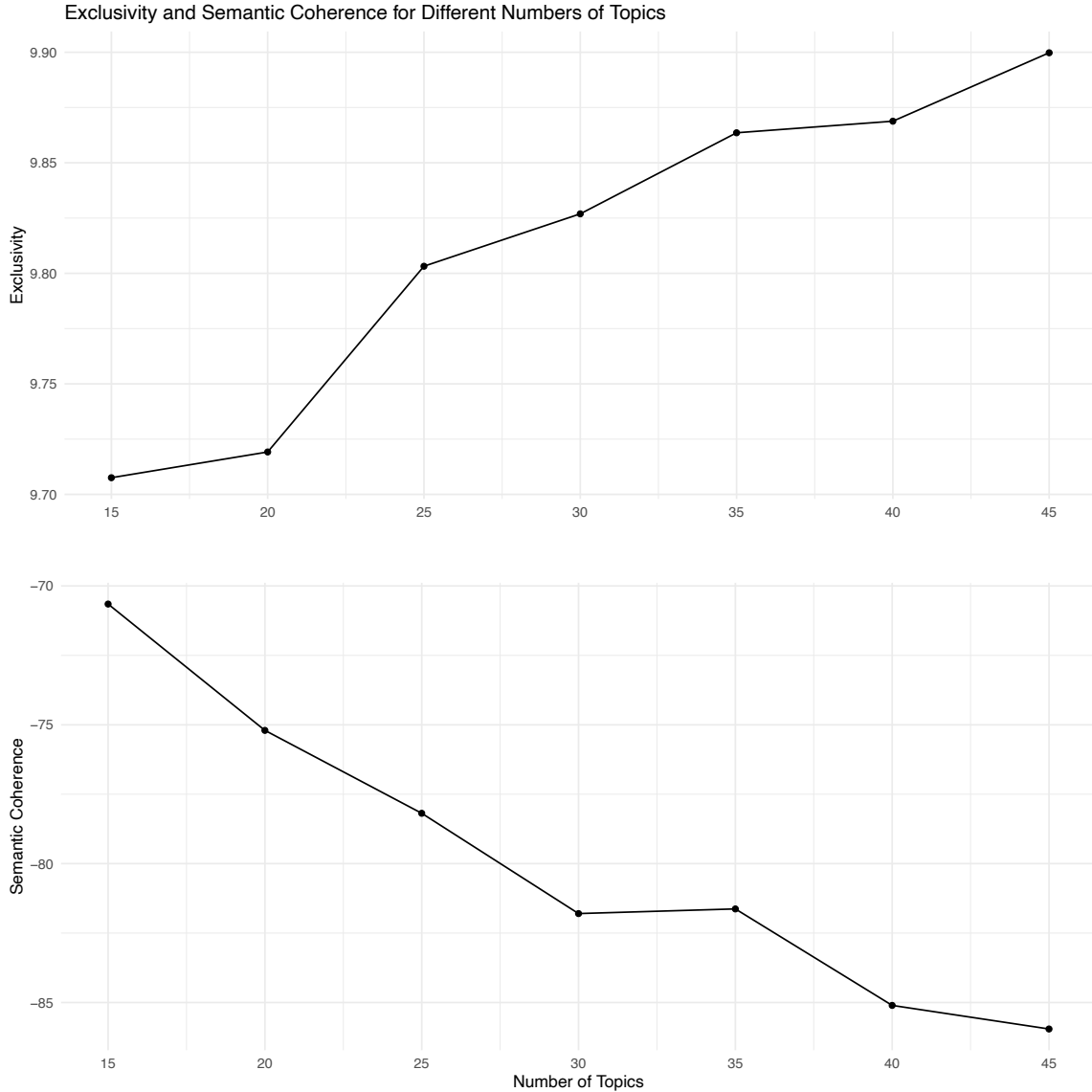

Figure C1: This figure reports the statistic of exclusivity and semantic coherence for 15 to 45 topics (by increments of 5).

D   Additional information on topic model output

D.1   Lists of 50 Most Frequent and Exclusive Words by Topic

1. Topic 1: Address — hon; member; vote; constitu; winnipeg; seat; side; centr; opposit; agre; remark; ; spoke; south; north; remind; east; west; favour; said; spoken; ; know; speech; ; recal; glad; support; chairman; wish; suggest; refer; speak; pleas; record; surpris; repres; behalf; listen; regret; york; withdraw; ask; sure; say; sorri; explain; red; invit; assur; heard; right

2. Topic 2: Question — minist; question; prime; answer; ask; whether; yesterday; tell; supplementari; speaker; direct; view; assur; cabinet; announc; statement; indic; intend; financ; like; explain; ; will; ministri; wonder; oral; repli; promis; ; can; prepar; give; now; decis; awar; confirm; said; deputi; polici; week; advis; light; fact; intent; action; morn; expect; refus; regard; govern; admit

3. Topic 3: Procedures 1 — hous; motion; discuss; common; session; order; resolut; rule; day; sit; proceed; stand; debat; consent; matter; oclock; move; adjourn; honour; privileg; tomorrow; notic; parliament; procedur; call; hour; afternoon; next; opportun; occas; paper; today; preced; time; present; urgent; subject; wish; week; consid; chair; morn; minut; busi; night; consider; bring; later; attent

4. Topic 4: Budget – year; total; million; amount; expenditur; estim; last; five; fiscal; spent; figur; four; three; dollar; month; annual; end; payment; period; six; next; half; ten; ago; fund; money; past; two; approxim; number; account; seven; march; spend; addit; previous; compar; eight; sum; show; main; sinc; current; grant; hundr; less; much; actual; loss

5. Topic 5: Kindness — friend; man; think; gentleman; say; might; matter; anyth; upon; statement; desir; gentlemen; shall; suggest; quit; know; moment; perhap; far; doubt; mind; seem; thought; give; connect; opinion; may; said; sir; glad; chairman; suppos; men; someth; regard; argument; done; noth; proper; get; thing; kind; littl; consider; whatev; satisfi; find; certain; attent

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6. Topic 6: Monetary — cent; per; rate; increas; averag; inflat; higher; reduc; reduct; lower; cost; percentag; loan; high; figur; interest; compar; less; statist; low; level; drop; pay; charg; substanti; factor; proport; show; basi; minimum; effect; adjust; ten; indic; profit; result; month; approxim; half; fix; wage; demand; greater; quot; bear; period; gone; valu; almost

7. Topic 7: Foreign — unit; state; secretari; foreign; intern; extern; american; treati; confer; affair; exchang; presid; canada; canadian; articl; america; border; action; relat; posit; south; visit; recent; aid; peac; york; meet; parliamentari; north; situat; particip; discuss; polici; invit; relationship; press; taken; concern; arrang; view; repres; held; secur; regard; sign; joint; similar; protest; conflict

8. Topic 8: Committee – report; committe; languag; recommend; tabl; document; offici; studi; review; french; stand; english; examin; wit; refer; evid; respons; parliamentari; special; joint; conduct; account; meet; task; appear; conclus; publish; honour; relat; expert; final; present; implement; set; prepar; note; procedur; consid; public; minor; affair; brief; quot; group; submit; annual; contain; page; held

9. Topic 9: Economic — program; region; econom; project; develop; sector; economi; invest; area; creat; new; technolog; brunswick; job; growth; fund; initi; plan; announc; improv; design; creation; futur; polici; expand; need; provid; level; agenc; approach; help; major; opportun; achiev; will; encourag; exampl; cooper; potenti; process; assist; term; activ; success; privat; signific; structur; involv; effici

10. Topic 10: Governing – get; thing; talk; back; happen; want; tri; lot; look; someth; realli; let; know; say; peopl; noth; around; see; just; come; never; start; tell; away; got; bad; everyth; wrong; put; told; done; kind; enough; littl; seen; els; went; stop; anyth; big; said; came; good; even; way; idea; can; recess; someon

11. Topic 11: Immigration – offic; depart; post; immigr; mail; staff; chief; general; communic; branch; divis; instruct; custom; head; ottawa; newspap; deputi; agenc; travel; charg; sent; resid; send; revenu; name; close; administr; offici; person; deliv; handl;

regular; open; arriv; duti; letter; rural; mani; former; complaint; organ; director; book; conduct; various; associ; locat; advis; assist

12. Topic 12: Procedure 2 – bill; legisl; introduc; pass; third; read; second; stage; piec; measur; principl; first; forward; time; will; privat; oppos; agre; hope; deal; move; improv; debat; amend; leav; bring; support; brought; delay; quick; draft; alreadi; implement; chang; allow; aspect; import; howev; alloc; final; long; intent; dealt; whole; limit; previous; act; detail; object

13. Topic 13: Election — parti; elect; liber; senat; democrat; leader; polit; conserv; opposit; ndp; bloc; unanim; reform; campaign; consult; democraci; process; support; oppos; major; independ; parliament; believ; progress; defend; repres; critic; posit; chang; forward; parliamentari; new; common; seek; former; issu; chamber; reject; minor; clear; confid; favour; propos; surpris; accept; debat; voic; opinion; interest

14. Topic 14: Regionalism — scotia; island; princ; ontario; counti; mine; john; maritim; halifax; subsidi; eastern; provinc; assist; new; dominion; central; represent; repres; popul; part; grant; close; aid; western; present; late; receiv; promis; extend; especi; technic; name; constitu; associ; follow; fair; establish; given; known; protest; consider; great; throughout; suffer; two; portion; special; rest; came

15. Topic 15: Transportation — railway; compani; transport; corpor; pacif; air; line; oper; car; privat; profit; canadian; stock; enterpris; crown; capit; busi; manag; share; guarante; director; system; commerci; road; interest; limit; competit; run; branch; northern; canada; ship; trust; charg; loss; invest; charter; compet; hold; control; hand; carri; travel; oblig; earn; handl; direct; advantag; station

16. Topic 16: Equalisation – quebec; provinci; columbia; feder; provinc; british; manitoba; premier; saskatchewan; constitut; jurisdict; alberta; govern; municip; equal; transfer; dominion; cooper; confer; accord; ottawa; america; share; respons; within; arrang; field; respect; popul; central; agre; repres; rest; various; represent; decid; recogn; compens; differ; distinct; separ; sinc; grant; agreement; guarante; reach; right; belong; meet

17. Topic 17: Trade — trade; agreement; manufactur; industri; free; commerc; tariff; export; negoti; union; import; duti; competit; protect; good; sign; market; custom; articl; compet; prefer; enter; deal; implement; american; restrict; impos; busi; product; advantag; favour; countri; affect; commerci; canada; reach; associ; firm; worth; balanc; conclud; open; benefit; fair; relat; result; effect; largest; prosper

18. Topic 18: Imperial — countri; great; world; war; britain; peac; polici; effort; histori; must; believ; feel; throughout; speech; greatest; realiz; everi; peopl; ever; success; becom; upon; express; greater; today; face; british; best; past; futur; toward; mind; condit; attitud; men; sir; VRAI; prosper; fear; spirit; fight; hope; danger; alway; enjoy; never; larg; part; rememb

19. Topic 19: Procedure 3 — section; act; amend; claus; provis; word; propos; shall; appli; definit; purpos; statut; paragraph; page; chang; therefor; contain; follow; chairman; mean; object; interpret; cover; may; provid; intent; origin; read; accept; subject; defin; effect; includ; design; refer; respect; except; move; permit; draft; form; exempt; intend; suggest; term; principl; restrict; adopt; otherwis

20. Topic 20: Energy — oil; fish; fisheri; nova; energi; resourc; coast; newfoundland; gas; atlant; natur; plant; water; alberta; industri; sourc; suppli; develop; west; east; environ; wast; conserv; problem; commerci; depend; limit; stock; area; manag; well; futur; use; generat; altern; potenti; canada; concern; process; serious; ground; affect; particular; protect; polici; close; import; move; can

21. Topic 21: Civil service — commiss; civil; servic; appoint; servant; public; salari; commission; royal; perform; select; posit; perman; employe; effici; class; examin; serv; fill; men; activ; outsid; promot; complaint; duti; experi; whose; qualifi; administr; engag; person; compet; organ; special; independ; function; former; mani; establish; practic; capac; provid; rang; essenti; staff; number; abil; deputi; manag

22. Topic 22: Agriculture — farmer; price; farm; wheat; agricultur; produc; grain; product; consum; sell; market; western; food; sold; sale; buy; board; suppli; surplus; saskatchewan; purchas; handl; payment; situat; grow; export; loss; deliv; abl; advanc;

10

credit; qualiti; distribut; demand; subsidi; good; get; fair; organ; stock; eastern; profit; larg; problem; condit; much; west; can; difficulti

23. Topic 23: Procedure 4 — colleagu; point; rise; comment; speaker; speech; madam; rais; think; debat; sure; thank; speak; quit; like; want; perhap; hear; obvious; issu; earlier; particular; understand; appreci; listen; remark; suggest; clear; concern; feel; seem; just; wonder; fact; minut; inde; howev; certain; make; happi; heard; mention; chair; rather; argument; privileg; deal; tri; correct

24. Topic 24: Military — pension; veteran; forc; age; old; militari; secur; plan; retir; senior; arm; war; allow; men; citizen; serv; contribut; benefit; receiv; depend; month; entitl; scheme; guarante; live; earn; person; singl; mani; man; affair; full; assist; reach; qualifi; case; basic; still; test; deserv; pay; join; mean; draw; group; now; resid; fight; leav

25. Topic 25: Health — health; defenc; nation; welfar; research; medic; standard; hospit; care; system; test; associ; treatment; emerg; field; organ; problem; transfer; first; prevent; qualiti; adequ; base; prioriti; activ; need; use; effect; expert; establish; respons; integr; avail; facil; level; institut; capabl; lack; role; caus; centr; set; provid; wast; risk; fund; studi; essenti; social

26. Topic 26: Environment — ensur; commit; petit; access; communiti; canadian; environ; role; cultur; current; safeti; impact; support; world; ride; proud; across; focus; respond; canada; challeng; play; issu; action; strong; pleas; continu; speaker; recogn; address; leadership; crisi; today; call; includ; signific; prioriti; effort; thank; intern; risk; histori; protect; initi; behalf; sign; realiti; safe; process

27. Topic 27: Navigation — citi; river; montreal; lake; toronto; mile; port; water; vancouv; ship; district; town; road; area; local; station; municip; west; winnipeg; built; facil; great; constitu; ride; north; larg; along; locat; ottawa; rural; small; east; south; street; centr; hundr; popul; two; near; run; thousand; one; three; york; place; condit; larger; travel; visit

28. Topic 28: Finance — author; council; power; board; bank; regul; approv; governor; control; parliament; institut; treasuri; exercis; administr; financi; bodi; loan; function;

order; grant; set; execut; presid; director; upon; necessari; crown; establish; charter; action; exist; within; determin; may; oblig; without; respons; trust; submit; interest; general; decid; pass; subject; limit; effect; enabl; emerg; proper

29. Topic 29: Ways and means — tax; incom; budget; billion; financ; debt; cut; taxpay; credit; deficit; money; taxat; revenu; busi; spend; small; pay; save; dollar; exempt; financi; reduc; burden; surplus; capit; sale; balanc; invest; reduct; economi; gain; govern; earn; fair; measur; collect; individu; system; impos; corpor; elimin; lower; low; rais; profit; mean; real; unfair; promis

30. Topic 30: Supply — contract; construct; build; item; purchas; cost; paid; work; equip; expens; materi; engin; use; properti; suppli; purpos; valu; complet; requir; owner; carri; firm; money; compens; amount; pay; sum; connect; done; plant; undertak; dispos; necessari; type; larg; public; cover; addit; built; portion; enter; limit; actual; estim; origin; obtain; suffici; provid; includ

31. Topic 31: Employment — unemploy; employ; insur; worker; labour; relief; job; wage; employe; benefit; strike; week; work; hour; union; collect; situat; problem; qualifi; find; minimum; lost; period; contribut; condit; earn; help; lose; scheme; solut; peopl; number; laid; measur; thousand; pay; adjust; solv; affect; face; offer; fund; longer; serious; entitl; receiv; leav; paid; difficulti

32. Topic 32: Procedure 5 — return; inform; date; request; letter; list; made; applic; januari; yes; investig; april; paper; receiv; juli; june; decemb; avail; copi; novemb; octob; februari; record; file; follow; statement; immedi; correspond; march; inquiri; august; septemb; name; detail; represent; given; regard; delay; sent; arrang; obtain; prior; sinc; repli; refer; appear; hansard; alleg; page

33. Topic 33: Justice — court; justic; law; crimin; crime; code; right; judg; polic; legal; appeal; case; enforc; individu; protect; freedom; person; lawyer; human; prevent; decis; death; charter; abus; evid; danger; accus; commit; serious; rule; citizen; involv; caus; judgment; circumst; impos; fundament; must; ground; process; system; fine; constitut; releas; determin; properti; minimum; charg; wit

34. Topic 34: First Nations — indian; land; educ; school; train; reserv; territori; student; claim; univers; northern; affair; peopl; grant; attend; technic; first; north; communiti; develop; summer; settl; cours; institut; high; learn; establish; mani; field; experi; opportun; degre; area; popul; treati; resid; separ; knowledg; among; assist; consult; part; futur; special; provid; aid; chief; becom; live

35. Topic 35: Social policy — women; famili; ; children; young; child; home; societi; social; live; life; group; equal; help; need; status; peopl; human; care; poor; often; choic; communiti; afford; learn; mani; suffer; work; better; support; abus; singl; experi; stay; recogn; earli; everi; face; among; opportun; day; must; address; real; centr; hard; becom; coupl; organ; other

D.2 Examples of speeches strongly associated with procedural topics

To illustrate what a highly procedural speech is, take for example the following intervention by John Watson MacNaught (Liberal, Minister Without Portfolio, Solicitor General of Canada): "Mr. Speaker, I think the rule applies only when the resolution is called for the first time immediately after Government Orders are called. In view of the fact that this resolution was called before, this rule does not apply" (May 1965, 77 per cent prevalence of procedural content). Or consider this speech from Richard Albert Bell, a Progressive Conservative member and Parliamentary Secretary to the Minister of Finance: "At the appropriate time, and in accordance with the rules of the House, I shall be delighted to deal with that matter and deal in particular with the courage which the Minister of Finance showed in handling the particular situation to which reference is made" (January 1960, 51.6 per cent prevalence of procedural content). And this intervention by Thomas Clement Dlouglas (NDP) in 1970: "All there is for the House to decide is whether or not unanimous consent is forthcoming. I do not think that any member or any party in the House can put a proviso on their approval. As far as we are concerned we are prepared to give unanimous support" (40.6 per cent prevalence of procedural topics).

Topics that we identify as "procedural" in the paper are more strongly associated with rules or proceedings terms, such as house, motion*, discuss*, session*, order*, day*, sit*,

proceed*, debat*, o'clock, move*, adjourn*, report*, committe*, tabl*, bil*, legisl*, intro-
duc*, stage, amend*, and so forth. In a topic model, each word from the corpus is included
in all of the different topics, but their weight varies. For instance, procedural terms 'score'
higher in procedural topics, but lower in the other topic categories from the model. In addi-
tion, each document (intervention) is a mixture of all topics that sums up to 100%. When
we say that an intervention has a 50% prevalence of procedural topics, it means that the
remaining 50% of the speech combines all of the other topics. In other words, the higher the
procedural content, the lower the relative prevalence of other more substantive topics. For
example, the following intervention "Mr. Speaker, in the next session there may be a bill.
But this House has already given approval in the amount of $10 million in the last fiscal
year and $16 million in this fiscal year for this type of program." (Horace Andrew Olson,
Minister of Agriculture, Liberal party, 1971) has a 27 per cent prevalence of procedural topics
and 34 per cent prevalence of the budget topic (topic 4). In short, the topic model offers a
continuum; we assume that a speech with higher prevalence of procedural topics is related
more to procedural content.

E   Additional tests

E.1   Effect of MP Position on the Prevalence of Issue Topics and "Idioms"

We use regression analysis to determine if the positions of MPs in the House of Commons influence the topics covered during their speeches. Tables E1 and E2 report the influence of MP position on the prevalence of issue topics and "idioms" topics. Note that the sum of the three categories (procedures + idioms + issues) in each individual speech always equals to one (100 per cent).

Each table includes one model where the dependent variable is the mean prevalence for each group of MP by year, and a second one where the dependent variable is the mean prevalence for each group of MP by parliament.[16] In both of these models, the baseline category is opposition backbenchers, compared to government frontbenchers, government backbenchers, and opposition frontbenchers. The models also includes a term component variable in the analysis to capture the effect of time.

E.2   Effect of MP Position on the Prevalence of Procedural Topics in Minority and Majority Governments

Could the prevalence of procedural topics increase during minority governments? In a similar vein, is it be possible that the effect of MP position on the prevalence of procedural topics be different during minority governments? To investigate these questions, we ran two linear regression models with mean prevalence of procedural topics (per year or parliament) as dependent variables, and minority governments as independent variables. Results from these models are reported in columns 1 and 3 of Table E3. They show that the prevalence of procedural content is somewhat higher during minority governments (on average, 2 percentage points higher during a minority parliament). The difference between groups of MPs, however, remains unchanged in minority and majority governments (see columns 2 and 4). Government and opposition frontbenchers always refer to procedures more than backbenchers, regardless of whether government is a minority or majority.

E.3 Effect of MP Position on the Prevalence of Procedural Topics, Different Parties

Are some parties more likely to use procedural content than others? If so, do frontbenchers or backbenchers of these parties act differently than frontbenchers/backbenchers of other parties? To investigate these questions, we ran two linear regression models with mean prevalence of procedural topics (per year or parliament) as dependent variables, and party as independent variable. This variable was coded into 3 categories: Liberal (reference category), Conservative, and all other parties. MPs from all other parties were merged together because the Conservative and Liberal parties are the only ones to have formed a government since Confederation. The models also include a continuous control variable for term (year or parliament).

Results from these models are reported in columns 1 and 3 of Table E4. Evidence shows that members of the Liberal party use procedural content more than any other members in the House, but the difference between Liberals and Conservatives is small and not statistically significant. In contrast, members of third parties use procedural content less than Liberal and Conservative MPs (the effect is significant), which is not surprising considering that no third party has ever formed a government.

In columns 2 and 4, we interacted the party variable with position in the House (gov./opp. front/backbenchers, with opposition backbenchers as reference category). Results show that the effect of MP position on the prevalence of procedural content is stronger for members of third (other) parties. In other words, the influence of MPs' position on the use of procedural content is stronger for third party members, when compared to members of the Liberal (and Conservative) parties. This result is most likely explained by the Standing Orders which allocated more speaking time to party leaders. Speaking time in the House of Commons is usually attributed according to the size of the caucus, but this rule applies less to party leaders who have special privileges during the debates (O'Brien and Bosc 2009, ch. 13). Therefore, it is not surprising to find that third party leaders speak more about procedures, when compared to the official opposition party (usually Liberal or Conservative, except in 1993-1997 when it was the Bloc Québécois, in 1997-2004 when it was the Reform Party and Canadian Alliance, and in 2011-2015 when it was the NDP).

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E.4 Effect of MP Position on Prevalence of Different Procedural Topics

Finally, to make sure that the differences between government and opposition front- and backbenchers that we find in the paper are not due to one procedural topic in particular, we ran several linear regression models with mean prevalence of each procedural topic (per year or parliament) as the dependent variables, and MP positions as the independent variables. Results can be found in Tables E5 and E6. First, the results confirm that opposition backbenchers are less likely to use procedural topics than any other group of MPs (except Procedure 2 related to the management of bills, used less often by government backbenchers). Second, we do find some variation in effects across topics when looking at government backbenchers vs. government and opposition frontbenchers. Contrary to the findings presented in the text, we find that government backbenchers are more likely to use the topic of Address than frontbenchers (from the two sides of the aisle). They are also more likely to use the topic of Committee than opposition frontbenchers and more likely to use the topic of Procedure 2 than government frontbenchers (equally likely if we aggregate by year). That said, Procedure 2 and Committee are the two least prevalent of all procedural topics (median prevalence per year = 2 per cent; per Parliament = 2.1 per cent), which explains why these differences cancel each other out in the end. Overall, then, the majority of procedural topics are in the direction reported in the main text: government and opposition frontbenchers are more likely to use procedural content than ordinary MPs.

E.5 Effect of the 1982 Rule Changes on MPs Who Served During the 32nd Parliament

What is the effect of a particular parliamentary rule change on the speech patterns of MPs who experienced it? To get insight into this question, we selected members who served during the 32nd Parliament (1980-1984), and therefore experienced the 1982 rule change described in the paper. To investigate changes in the speech patterns of the MPs who served in this Parliament, we began by calculating the average prevalence of a) procedural content, b) issue content and c) 'idioms' content used by these MPs before and after the rule change (December 1982). This provided us with six averages for every MP, two for each of the topical categories.

MPs who did not participate in the debates in either one of the two periods were dropped from the analysis.

We then performed two-sided paired t-tests to verify if the prevalence of a) procedural content, b) issue content, and and c) idioms content was different for these MPs before and after the rule change was put in place. In line with what we find in the paper when looking at the entire period (results from the change point model), the analysis confirms that MPs who served in the 32nd parliament did reduce their use of procedural content after the introduction of the 1982 rule (t = -3.2036, df = 277, p-value = 0.002). In return, the prevalence of issue content among these MPs—such as content related to budgetary issues, social policy, foreign policy, regionalism, and so forth—increased after the rule change (t = 3.0061, df = 277, p-value = 0.003). Their use of idioms—such as general words (minist; question; prime; answer; ask; whether; and so forth)—did not change (t = -0.13136, df = 277, p-value = 0.896). These results seem to suggest a substitution effect: MPs who experienced the 1982 rule change started to focus more on substantive issues, rather than on procedures, as was the case before.

But was everyone able to do so equally, or did some MPs continue to use procedural content just as much as before? Recall that government and opposition frontbenchers use procedural content more than backbenchers, especially from the government side (Table 1 in the paper). To answer this question, we ran the same tests, but this time differentiating between government frontbenchers, government backbenchers, opposition frontbenchers and opposition backbenchers. Results show that government frontbenchers and opposition backbenchers in the 32nd Parliament represent the two groups of MPs who increased their interventions on substantive issues the most after the 1982 rule change (gov. frontbenchers: t = 1.7758, df = 68, p-value = 0.08; opp. backbenchers: t = 1.8092, df = 129, p-value = 0.07). Opposition backbenchers are also those who reduced their use of procedural content the most (t = -1.7508, df = 129, p-value = 0.08). For other categories of MPs, the difference in usage of procedural speech before and after the rule changes was not statistically significant.

Finally, we verified if the December 1982 rule changes impacted some parties more than others. Note that the Liberal party was in power during the 32nd Parliament, so it would not be surprising for Liberal MPs to react differently than Conservative or NDP members

(since opposition backbenchers reduced their use of procedural content the most after the rule change). Results show that MPs from all parties reduced their use of procedural content after the December 1982 rule change, but Liberal members (t = -2.9903, df = 140, p-value = 0.003294) are the only ones for which the difference is significant (Conservative: t = -0.36764, df = 101, p-value = 0.7139; NDP: t = -1.2981, df = 31, p-value = 0.2038). In short, members of the two opposition parties reacted similarly to rule changes. Liberal members changed their behaviour more drastically, but this can be attributed to the fact that they were in government.

Table E1: Effect of MP Position on Prevalence of Issue Topics, 1901-2015

| | Mean prevalence of issue topics | |
	Yearly	by Parliament
Gov. backbenchers	0.01	0.01
	(0.01)	(0.01)
Gov. frontbenchers	−0.02***	−0.02
	(0.01)	(0.01)
Opp. frontbenchers	−0.08***	−0.07***
	(0.01)	(0.01)
Term	0.001***	0.003***
	(0.0001)	(0.0004)
Constant	0.45***	0.44***
	(0.01)	(0.01)
Observations	452	132
R^2	0.47	0.48
Residual Std. Error	0.05 (df = 447)	0.05 (df = 127)

Note: *p<0.1; **p<0.05; ***p<0.01
 'Term' ranges from 1 to 115 in the first model (1901 to 2015)
 and from 1 to 33 in the second model (9th to 41st Parliaments).
 Standard errors in parentheses.

Table E2: Effect of MP Position on Prevalence of 'Idioms' Topics, 1901-2015

| | Mean prevalence of 'idioms' topics | |
	Yearly	by Parliament
Gov. backbenchers	−0.03***	−0.03***
	(0.003)	(0.004)
Gov. frontbenchers	−0.03***	−0.03***
	(0.003)	(0.004)
Opp. frontbenchers	0.02***	0.02***
	(0.003)	(0.004)
Term	−0.001***	−0.004***
	(0.0000)	(0.0002)
Constant	0.34***	0.34***
	(0.002)	(0.004)
Observations	452	132
R^2	0.87	0.89
Residual Std. Error	0.02 (df = 447)	0.02 (df = 127)

Note: *p<0.1; **p<0.05; ***p<0.01

'Term' ranges from 1 to 115 in the first model (1901 to 2015)
and from 1 to 33 in the second model (9th to 41st Parliaments).
Standard errors in parentheses.

Table E3: Effect of MP Position on Prevalence of Procedural Topics, Majority vs. Minority Governments, 1901-2015

	Yearly	Yearly	by Parliament	by Parliament
Minority	0.01*	0.01	0.02**	0.01
	(0.01)	(0.01)	(0.01)	(0.02)
Gov. back		0.02***		0.02*
		(0.01)		(0.01)
Gov. front		0.05***		0.05***
		(0.01)		(0.01)
Opp. front		0.05***		0.05***
		(0.01)		(0.01)
Gov. back*Minority		0.01		0.02
		(0.01)		(0.02)
Gov. front*Minority		0.01		0.01
		(0.01)		(0.02)
Opp. front*Minority		−0.01		−0.003
		(0.01)		(0.02)
Constant	0.26***	0.23***	0.26***	0.23***
	(0.002)	(0.004)	(0.005)	(0.01)
Observations	452	452	132	132
R^2	0.01	0.21	0.04	0.25
Residual Std. Error	0.05 (df = 450)	0.04 (df = 444)	0.04 (df = 130)	0.04 (df = 124)

Note: Standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01

Table E4: Effect of MP Position on Prevalence of Procedural Topics, Different Parties, 1901-2015

	Yearly	Yearly	by Parliament	by Parliament
Gov. back		0.03***		0.02
		(0.01)		(0.01)
Gov. front		0.05***		0.03**
		(0.01)		(0.01)
Opp. front		0.05***		0.04**
		(0.01)		(0.02)
Conservative	−0.01	0.001	−0.003	−0.01
	(0.004)	(0.01)	(0.01)	(0.01)
Other	−0.01***	−0.005	−0.01	−0.01
	(0.005)	(0.01)	(0.01)	(0.01)
Term	0.0004***	0.0003***	0.001***	0.001**
	(0.0001)	(0.0001)	(0.0004)	(0.0003)
Gov. back*Conservative		−0.01		0.02
		(0.01)		(0.02)
Gov. front*Conservative		−0.005		0.02
		(0.01)		(0.02)
Opp. front*Conservative		0.005		0.01
		(0.01)		(0.02)
Gov. back*Other		NA		NA
		NA		NA
Gov. front*Other		NA		NA
		NA		NA
Opp. front*Other		0.02*		0.03
		(0.01)		(0.02)
Constant	0.24***	0.21***	0.25***	0.23***
	(0.005)	(0.01)	(0.01)	(0.01)
Observations	662	662	194	194
R²	0.08	0.31	0.04	0.29
Residual Std. Error	0.05 (df = 658)	0.04 (df = 651)	0.05 (df = 190)	0.04 (df = 183)

Note: Standard errors in parentheses. *p<0.1; **p<0.05; ***p<0.01
'Term' ranges from 1 to 33 (9th to 41st Parliaments) in the Parliament models
and from 1 to 115 (1901 to 2015) in the Yearly models.

Table E5: Effect of MP Position on Prevalence of Procedural Topics (by Parliament), 1901-2015

	Address	Proc. 1	Committee	Proc. 2	Proc. 3	Proc. 4	Proc. 5
Gov. backbenchers	0.015***	0.008**	0.003***	0.003***	0.0003	0.007**	−0.007***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)
Gov. frontbenchers	0.010***	0.009***	0.005***	0.002***	0.007***	0.009***	0.008***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)
Opp. frontbenchers	0.005**	0.022***	0.002**	0.004***	0.007***	0.009***	0.0001
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)
Term	−0.001***	−0.00004	0.0004***	0.0003***	−0.001***	0.003***	−0.001***
	(0.0001)	(0.0001)	(0.00003)	(0.00003)	(0.0001)	(0.0001)	(0.0001)
Constant	0.045***	0.042***	0.013***	0.014***	0.053***	−0.007**	0.054***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)
Observations	132	132	132	132	132	132	132
R^2	0.504	0.272	0.614	0.569	0.790	0.854	0.480
Residual Std. Error (df = 127)	0.009	0.013	0.003	0.003	0.006	0.013	0.009

Note: Standard errors in parentheses. 'Term' ranges from 1 to 33 (9th to 41st Parliaments). *p<0.1; **p<0.05; ***p<0.01

Table E6: Effect of MP Position on Prevalence of Procedural Topics (by Year), 1901-2015

	Address	Proc. 1	Committee	Proc. 2	Proc. 3	Proc. 4	Proc. 5
Gov. backbenchers	0.015***	0.007***	0.003***	0.002***	−0.0002	0.006***	−0.007***
	(0.001)	(0.002)	(0.0005)	(0.0004)	(0.001)	(0.002)	(0.001)
Gov. frontbenchers	0.009***	0.009***	0.005***	0.002***	0.007***	0.008***	0.007***
	(0.001)	(0.002)	(0.0005)	(0.0004)	(0.001)	(0.002)	(0.001)
Opp. frontbenchers	0.005***	0.022***	0.002***	0.004***	0.007***	0.010***	−0.00002
	(0.001)	(0.002)	(0.0005)	(0.0004)	(0.001)	(0.002)	(0.001)
Term	−0.0002***	0.00000	0.0001***	0.0001***	−0.0004***	0.001***	−0.0002***
	(0.00001)	(0.00002)	(0.00001)	(0.00000)	(0.00001)	(0.00002)	(0.00001)
Constant	0.044***	0.040***	0.013***	0.013***	0.054***	−0.012***	0.054***
	(0.001)	(0.002)	(0.0005)	(0.0004)	(0.001)	(0.002)	(0.001)
Observations	452	452	452	452	452	452	452
R^2	0.468	0.267	0.573	0.489	0.691	0.851	0.455
Residual Std. Error (df = 447)	0.009	0.013	0.004	0.003	0.008	0.013	0.009

Note: Standard errors in parentheses. 'Term' ranges from 1 to 115 (1901 to 2015). *p<0.1; **p<0.05; ***p<0.01

F Diversity in issue topics and speech similarity

The top plot of Figure F1 reports the Simpson's diversity index in issue topics between 1901 and 2015 in the Canadian Parliament. Simpson's diversity index corresponds to the probability that two units taken from the same sample belong to the same category (DeJong, 1975; Barcelona Field Study Center, 2020). Larger values indicate that there is more diversity in the number of topics discussed in the House, lower values imply the reverse. The plot shows that beginning in the mid-1970s, the diversity of issue topics discussed in the House has started to decline in Canada.

The bottom plot of Figure F1 reports the cosine similarity between speeches pronounced by government frontbenchers and the other groups identified in the House. It is obtained by aggregating all of the speeches pronounced by members of each group in a bag-of-words, and by calculating the cosine similarity between government frontbenchers with the other three groups.[17] Cosines closer to 1 indicate more similar vectors of words, cosines equal to 0 indicate orthogonal (unrelated) vectors, and cosines closer to -1 indicate that vectors have opposite meaning. In our case, cosine similarity began to increase in the mid-1970s, indicating that all three groups of MPs increasingly use a more similar vocabulary in the Canadian House of Commons after this point.
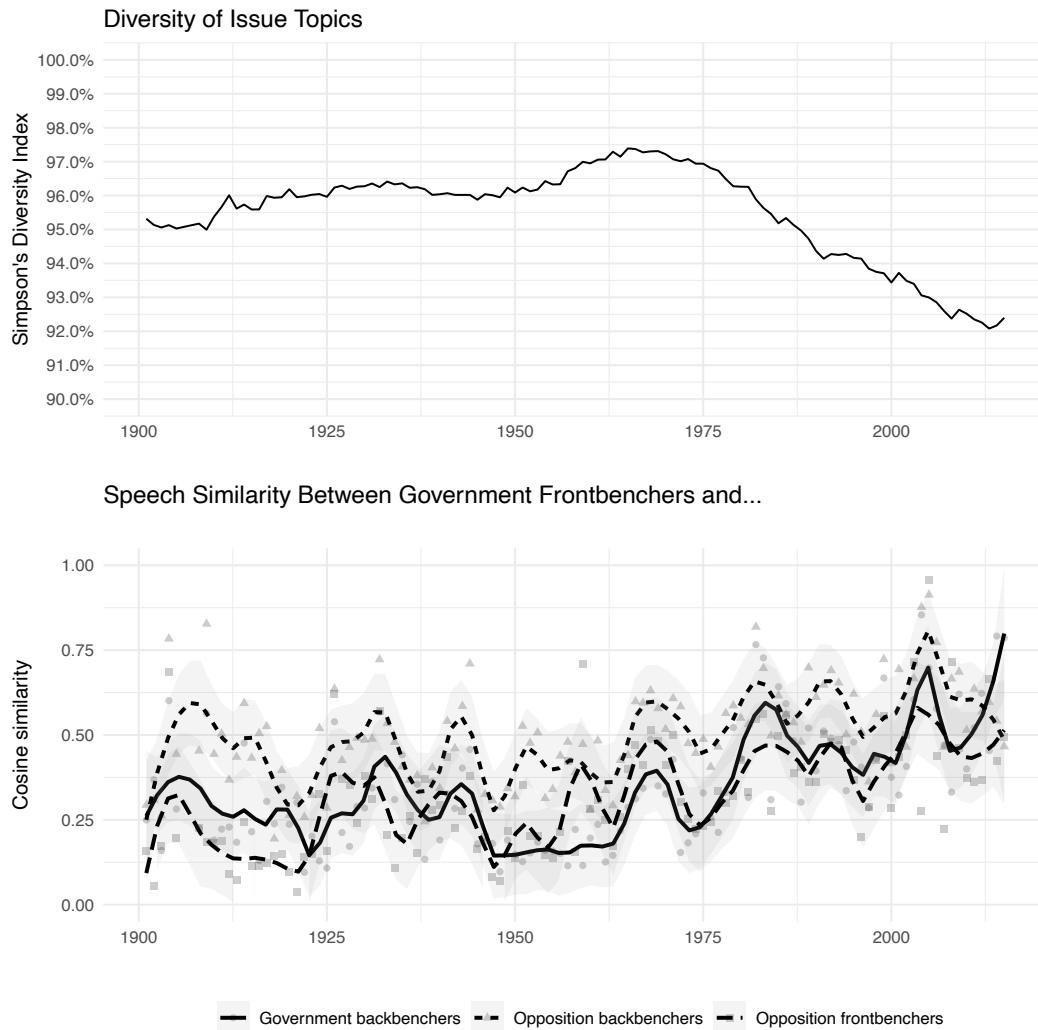
Diversity of Issue Topics

Speech Similarity Between Government Frontbenchers and...

Figure F1: The top plot reports the Simpson's diversity index in issue topics between 1901 and 2015 in the Canadian Parliament. The bottom plot reports the cosine similarity between speeches pronounced by government frontbenchers and the other groups identified in the House.