

How Electoral Reform Alters Legislative Speech: Evidence from the Parliament of Victoria, Australia 1992 – 2017

Abstract

Does changing single-member district (SMD) systems to proportional representation (PR) systems affect politicians' behavior? Previous studies, which have utilized cross-sectional or temporal variation in electoral systems, fail to estimate their effects. In contrast, we employ a difference-in-differences design and text analysis to estimate the causal effect of an electoral reform on politicians' issue attention. In particular, we estimate the causal effect of the electoral reform in the Parliament of Victoria in Australia 2003, which changed the electoral systems of the Legislative Council from SMD to PR while holding the system of the Legislative Assembly constant. We analyzed a newly collected dataset of legislators' inaugural speeches from 1992 to 2017 using a topic model. The results show the electoral reform increased politicians' attention to new economic issues but did not decrease attention to local interests such as promoting primary industries.

Keywords: Electoral Reform, Political Representation, Difference-in-Differences, Text-as-Data

1. Introduction

How do electoral reforms affect the nature of interest representation? In particular, do legislators behave differently if the electoral system changes from a single-member district (SMD) system to a proportional representation (PR) system?

Numerous studies have examined how electoral systems shape political representation. Most of the existing research has examined the representation of citizens' voices from the viewpoint of party systems and government accountability. These studies find, for example, that majoritarian systems aggregate voters' opinions and articulate the responsibility of a government, while PR systems create ideological congruence between citizens and the government because of proportional electoral results (Powell 2000).

However, as Rickard (2018) argues, existing research focusing on interest representation rather than ideological representation finds mixed evidence on the effect of electoral systems. Chang et al. (2010) argue that governments in SMD systems tend to adopt more consumer-friendly policies than in PR systems because small differences in vote shares induce large differences in legislative seat shares in elections under the SMD system. In contrast, some studies argue that governments elected by SMDs allocate material goods in geographically targeted ways. Therefore, SMD countries develop smaller welfare states than PR countries (Persson and Tabellini 2003).

Because different electoral systems are used even in a single country, policy outcomes are contaminated by multi-level elections (Herron and Nishikawa 2001). Therefore, we cannot identify which level of the electoral system affected the policy outcomes. Thus, if we are interested in the pure effects of electoral systems on political representation, we should examine policy focus at the individual politician level, instead of using cross-country comparisons of policy outcomes.

On the other hand, literature on parliamentarians' behavior, focusing on whether voters

can cast a vote for a candidate or a party rather than focusing on the electoral formula (i.e., majoritarian or PR system), also have the same challenges. Carey and Shugart (1995), in an influential study of electoral systems and personal votes, examine the theoretical relationship between electoral systems and politicians' vote-seeking behavior, using the ballot, pool, types of vote, and district magnitude. In their theory, in an electoral system that where voters can express preference for a candidate with high district magnitude, parliamentarians seek personal votes and deliver particularistic goods to their districts. Recent empirical studies have tested their theory but given data unavailability and the problem of operationalization of politicians' behavior, the empirical literature does not reach a consensus (André and Depauw 2013, 2014). Existing research often uses cross-country variation in electoral systems, limiting our ability to attribute the causes of patterns of politicians' activities to the influence of electoral systems or unobservable heterogeneities of countries like culture. In sum, existing research has limitations in estimating the causal effects of the electoral reform.

In this article, we employ a difference-in-differences research design utilizing the electoral reform in a bicameral legislature and analyze novel data on legislative speeches via quantitative text-analysis methods to examine the relationship between electoral systems and legislative behavior. Specifically, we use the case of the electoral reform in the Parliament of Victoria, Australia in 2006, which changed the electoral system in the upper house from an SMD system to a flexible-list PR system (namely, a single transferable vote [STV] system) while keeping the SMD system in the lower house. Though it is usually difficult to observe politicians' policy focuses, we estimated legislators' latent interests via inaugural speeches, which contain the politicians' political beliefs and policy focuses, using a structural topic model. Our results show that the electoral reform caused legislators to pay more attention to general economic policies but did not change their attention to the protection of primary industries and rural infrastructure.

2. Electoral Systems and Interest Representation

Electoral systems affect political representation through parliamentarians' vote-seeking behavior. Existing research argues that the electoral formula (i.e., how many votes politicians need to be elected) affects their likelihood of representing broad national voters. For example, Park and Jensen (2007) claim that farmers' particularistic interests are underrepresented in majoritarian countries because in this system candidates seek to build a broad coalition of voters.

However, whether politicians represent national voters depends on what one assumes about the demographical homogeneity of electoral districts across the country. To test this argument, we should assume that the power of farmers is low in all districts, but this assumption rarely holds. Some industries tend to be geographically concentrated (Rickard 2018).

Rather, politicians from electoral systems with geographically defined districts represent *voters in their electoral districts*, but they need not care about *national voters*. Politicians elected from SMDs should be affected by their local constituencies (Morgenstern 2017; Rickard 2018; Zittel, Nyhuis, and Baumann 2019). For instance, lawmakers from SMDs cannot free-ride on other politicians in the same district, so they work harder to build their constituencies than those from multi-member districts (Mayhew 1974, Rogowski 2017).

Politicians' incentives to enhance their party's reputation are important for representing national constituencies beyond districts, that is, we should focus on whether the electoral system fosters politicians' personal or party vote-seeking. If candidates rely on personal votes, they represent narrow interests at the expense of broad interests because their personal reputations are maintained irrespective of national party brands (Cain, Ferejohn, and Fiorina 1987). Candidate-centered electoral systems, which allow voters to express a preference for a candidate instead of a party, with large districts (e.g., an open-list PR), induce candidates' personal vote-seeking (Carey and Shugart 1995).

Comparing an SMD system and a closed-list PR, the former is the least personal system among the candidate-centered systems because voters cast a nominal vote but there is no intra-party competition, and the latter is the most party-oriented system in which voters choose only a party and cannot express a preference for candidates (Shugart 2001). With the party leaders' ability to select candidates, parliamentarians from a closed-list PR depend on their party's reputation.

Nevertheless, parliamentarians from a closed-list PR (other than those from nationwide districts), care about their geographical constituencies as much as those from SMDs because the country is divided into several districts. In particular, parliamentarians from small district closed-list PR, who have few co-partisans in their districts, not only depend on the party's reputation but also behave as representatives of the whole district. Therefore, the differences in parliamentarians from SMD and PR with high district magnitudes will be large. In sum, we formulate the following hypothesis.

Hypothesis: Parliamentarians from a closed-list PR are more likely to appeal to broad constituencies to enhance party reputation than those from SMDs.

3. Empirical Problems with Existing Research

The theory predicts parliamentarians from a closed-list PR are more likely to represent broad interests than ones from SMD, but the empirical literature does not reach a consensus. One of the reasons why the literature provides inconclusive results is that existing research uses cross-sectional analysis and before-after comparisons. These methods have limitations in estimating the causal effects of electoral systems on political representation.

Because electoral systems are rarely changed, most research employs cross-country comparisons (Deschouwer and Depauw 2014). However, in this research, the effect of the

electoral system is conflated with unobservable heterogeneity between countries, even though some studies employ multilevel regression. Though some studies use survey data (e.g., André and Depauw 2014; Deschouwer and Depauw 2014), which can capture unobservable activities of legislators, we cannot compare legislator behavior in different periods because most survey data are collected at one time point.

To tackle this problem, some studies use mixed-member electoral systems to compare SMD and PR systems within a single country (Moser and Scheiner 2012). Stratmann and Baur (2002) find that legislators elected from SMDs tend to belong to committees related to pork-barrel spending in the German Bundestag, compared to legislators from PR systems. While these study designs can control for the country's political cultures, they cannot control for unobservable heterogeneity between legislators from SMD and PR systems. In addition, because most members are nominated as district candidates but are also on party lists, it is difficult to estimate the pure effect of the electoral systems (Manow 2013).

Other studies analyze the political consequences of electoral systems using electoral reforms within a country. Some studies of the Japanese case claim the electoral reform transformed politics (e.g., Catalinac 2015). However, because research on the electoral reform in Japan used before-after comparison, it might not capture the pure effects of the reform. For example, Catalinac (2015) finds that Japanese candidates who were elected before the reform by single non-transferable votes, which is the most candidate-centered system, committed to pork-barrel projects, while candidates who were elected from SMDs after the reform committed to broad policies like national security issues. However, because Japan has suffered a recession, expanded the fiscal deficit, and faced changing international circumstances in the period after the reform, we cannot distinguish the effect of the electoral system from the effect of socioeconomic conditions as the cause of this political transformation. Høyland and Søyland (2019) find that legislators focused more on partisan affairs after the introduction of PR in the

Norwegian Storting election. However, because of using the before-and-after comparison, their study also cannot exclude the effects of socio-economic trends on contents of speeches. Therefore, existing research has limitations in estimating the effect of electoral systems on politicians' activities.

4. Method and Data

This article employs a difference-in-differences design using the electoral reform in a bicameral legislature to deal with the problems.

4.1 Research Design: Difference-in-Differences

To estimate causal effects, we must consider what outcomes would have occurred under counterfactual circumstances. In the electoral reform example, we should consider the outcome where *electoral reform did not happen* in countries where it actually did. We cannot estimate the causal effects by simply comparing outcomes before and after the reform when other factors that affect the outcomes vary after the reforms.

While there are some methods to estimate causal effects using observational data, difference-in-differences analysis is easily applicable to various outcomes (Angrist and Pischke 2008). This method compares the levels of outcome changes between a treatment group and a control group which are assumed to change similarly without treatment. This comparison is represented as the following equation, $\text{TreatmentEffect} = (Y_t^{Tr} - Y_{t-1}^{Tr}) - (Y_t^C - Y_{t-1}^C)$ where t represents periods after treatment; $t - 1$ represents before treatment; and the superscripts Tr and C represent the treatment group and the control group. Because this method is a comparison of levels, we can hold the unobservable heterogeneity between groups and common time-series shocks constant, even though these cannot be controlled in cross-country analysis and simple before-after comparisons. We can estimate the difference-in-differences treatment effect in the

following regression equation forms: $Y_{it} = \alpha + \beta_1 Tr_i + \beta_2 After_i + \beta_3 Tr_i * After_i + \epsilon_{it}$ where Tr is an indicator variable that the observation is the treatment group; $After$ is an indicator variable representing that the observation is in the period after treatment; $Tr * After$ is an interaction term of Tr and $After$; and ϵ_{it} is an error term. In this equation, our parameter of interest is β_3 , which represents the treatment effect.

In the electoral reform context, when we can compare the cases of electoral reform to cases that did not experience reform, we use the difference-in-differences method to estimate the causal effect of the electoral reform.

4.2 The Case of the Parliament of Victoria, Australia

The case of the Parliament of Victoria, Australia can be used to estimate causal effects by employing a difference-in-differences design. All of the state parliaments in Australia, except the state of Queensland, are bicameral legislatures where both houses are directly elected. Thus, Australian state parliaments are important cases for analyzing the effect of electoral systems on legislators' activities by comparing lower houses and upper houses. The Parliament of Victoria changed the electoral system of the upper house in 2003 and 2004. Prior to the reform, the upper house of Victoria, which is called the Legislative Council, used the SMD system with the alternative vote (AV), which is also used in the lower house. Since the reform, the upper house election has been conducted using STV but with a substantially flexible-list PR system.

The AV system is also known as a preferential vote system. In this system, voters rank preference orders of several candidates even though the district only elects one representative. Because candidates who get 50% of the transferred votes are elected, this system is a variant of absolute majoritarian systems.

After the reform, a STV system whose district magnitude is five has been used to elect

forty members of the upper house. The districts have almost same number of voters. The electoral system is an STV in terms of seat allocation but is like a flexible-list PR system in terms of its ballot paper. In this electoral system, the ballot paper is divided into two parts: *above the line* and *below the line*. Voters have the opportunity to choose either *below the line* (ranking candidates) or *above the line* (voting for a party). As a simple STV, voters can choose at least five candidates from the *below the line* candidate names presented. On the other hand, party names are presented *above the line* and voters mark only one party. When a voter chooses *above the line*, as with closed-list PR, the vote is seen as a preferential vote for a list in which the party designates the order of candidates who are shown *below the line*. The candidates for the Legislative Council of two major parties, the Australian Labor Party (ALP) and the Liberal Party, are nominated by their state branches.¹

In the 2014 election, 93 % of voters chose *above the line*, that is, most voters chose to mark a party instead of ranking candidates (Green 2018). This suggests that a lot of candidates depend on party votes to get elected in upper house elections after the reform (McAllister and Makkai 2018).

¹ With regards to the ALP, the Administrative Committee and the Public office Committee decide the candidates for Legislative Council (Australian Labor Party Victorian Branch 2018), considering members' votes. The Liberal Party preselect candidates at a Convention which comprises the Leader of the State Parliamentary Party or nominee of it, State President, Vice Presidents, and delegates from district members (Liberal Party of Australia Victorian Division 2019). With the possibility that candidate selection methods affect parliamentarians' policy focus, we also control the politicians' affiliation (See supplementary material).

Considering this ballot paper where voters mark a party list, parliamentarians are expected to broaden their focuses to the interests of the entire state, but because of the five-member districts, the difference in the attention to geographical constituencies will be small.

The reform was conducted as a constitutional amendment in 2003 (Constitution [Parliamentary Reform] ACT 2003) and amendment of the electoral law in 2004 under the Labor government led by Premier of Victoria Steve Bracks.² The Labor government aimed to increase proportionality and representativeness through the reform (Bowler and Donovan 2013; Economou 2008). The Victorian Premier Steve Bracks said that "The Liberal Party, with just 42 percent of the primary vote, secured 60 percent of the seats in the last three elections and no independent or minor party has been elected to the Council in the last 50 years. Our reforms will provide a Parliament that is more responsive and reflective of the wider community" (Whale 2006). Therefore, the aim of the reform was increasing proportionality and transforming the party system, not changing individual interest representation and enforcing strong party discipline. In other words, because changing voters' expectations for parliamentarians did not drive the reform, we can assume that changing voters' demands for politicians and policy focuses of politicians are not confounding factor.

In sum, we use the reform from the SMD system to a substantial flexible-list PR system as treatment and set the upper house as the treatment group and the lower house as the control group to conduct a difference-in-differences analysis. We can estimate a causal effect of the reform eliminating the possibilities of alternative explanations, such as differences in the role

² In 2001, the Premier appointed the constitution commission to examine the upper house reform. Subsequently, most of the recommendations reported by the commission were included in the constitution reform (Whale 2006).

of perceptions in both houses and common shocks such as economic conditions. In particular, because we analyze the differences within the state, we can safely assume that there is no difference in policy agenda between the houses, and the trend of fiscal conditions is assumed to be the same. Therefore, the Parliament of Victoria is a crucial case to estimate the effect of the electoral reform.

4.3 Data: Inaugural speeches of legislators

By using a topic model, we analyze inaugural speeches to estimate the latent interests of politicians. In the Parliament of Victoria, a first-term member of parliament (MP) delivers a speech to present their political focus and belief. In recent years, some research has focused on speeches in legislatures to estimate legislators' interests and propensity to dissent from their party (Bäck and Debus 2016; Proksch and Slapin 2015; Zittel, Nyhuis, and Baumann 2019). Inaugural speeches can be used to estimate politicians' general areas of policy attention. Compared to other types of legislative speech, where legislators discuss the specific contents of bills, an inaugural speech contains a legislator's various policy interests, like manifestos. Because all first-term politicians make inaugural speeches, selection bias associated with the strategic allocation of speech time by the leadership to obedient backbenchers can be minimized.³ In addition to this, in contrast with the one-shot legislative survey, using speeches enables us to estimate politicians' interests for the long term.

We collected politician's speeches from the website of the Parliament of Victoria.

³ Some studies find that the leadership does not allocate speech time to dissident politicians who would criticize their party (Bäck et al. 2019). Therefore, using other types of legislative speeches could produce biased results when backbenchers are obedient to the leadership.

Speeches made by 268 MPs from 1992 to 2017 were collected. Aside from by-elections, the elections of both houses are usually conducted concurrently; thus, we can ignore the effect of electoral cycles on the activities of legislators. By analyzing only first-term politicians, the effects of socialization,⁴ building constituencies, and the possibility that politicians influenced the electoral reform can be excluded.

Our dataset contains 102 members of the legislative assembly in the period before the reform, 72 members of the legislative assembly in the period after the reform, 52 members of the legislative council before the reform, and 42 members of the legislative council after the reform (partisan representation is shown in the supplementary material).

4.4 Structural topic model: Estimating political interests

In this article, we use quantitative text analysis methods, which have recently been widely used in political science (Grimmer and Stewart 2013), to estimate politicians' latent policy focuses from political speeches. In particular, this article tries to estimate legislators' focuses by using the structural topic model (STM), which is a variant of classification methods (Roberts, Stewart, and Tingley 2014).⁵

The topic model is a method to estimate latent topic proportions (or referring probability) of documents.⁶ It is an example of unsupervised learning, which can identify topics

⁴ Some studies based on historical institutionalism argue that institutional legacies would affect legislative behavior even after reforms (Krauss and Pekkanen 2011). By limiting our study to the speeches of first-term legislators, we avoid this possibility.

⁵ The STM version we used is 1.3.3.

⁶ Unlike a unidimensional approximation of parliamentarians' interests in geographical

that analysts did not expect to appear. We do not know what Victorian legislators think beforehand; thus, the topic model is suitable for our research purpose. This article uses the STM, which uses a generalized linear model to estimate the effects of covariates on topic proportions given prior distributions about topic prevalence. (Roberts, Stewart, and Tingley 2014).⁷

We estimate the following model of the topic prevalence: $\theta_{ki} = \eta_k Council_i + \gamma_k AfterReform_i + \tau_k Council_i * AfterReform_i$, where k represents a topic number; i represents an individual politician; θ_{ki} is a proportion of the k th topic, *Council* indicates a member of the upper house; and *AfterReform* indicates periods after the electoral reform.⁸ Our quantity of interest is τ_k , which is the coefficient of the interaction term of *Council* and *AfterReform*. As noted above, in the difference-in-differences design, we can interpret τ_k as the causal effect of the electoral reform. The coefficient represents changes in the levels of proportions of topics between two houses and periods. For example, positive τ_k means that,

constituencies, the topic model enables us to learn what effect the electoral system has on the type of policies parliamentarians pay attention to.

⁷ To replicate the results, we used a “spectral” method as the initialization method in the STM.

⁸ One might think that appearance of minor parties would affect legislative speeches. We also test another specification to control the variable indicating the major party politicians, but our conclusions hold (see supplementary material). Since the party system change is a result of the reform, we do not control for this in the main model. Additionally, support for minor parties per se remains nearly the same before and after the reform, and recently minor parties have also competed in the lower house election (see supplementary material).

on average, the members of the upper house refer to the topic k after the reform more than the predicted counterfactual outcome of the upper house.

Text preprocessing is conducted in the following ways.⁹ Following the convention, we ignore the order of the words following the bags-of-words assumption. We discard “stopwords,” such as articles and words which appear frequently in the speeches but are irrelevant, like people, government, and electorate. In addition, we remove infrequent words, which appear less than five times in the entire body of speech, and geographical names to minimize the possibility that we cannot interpret the results. We do not conduct stemming.¹⁰ We keep words whose length is at least two characters. Following the preprocessing process, we have 6,304 features to be used in the analysis. We set the topic number $K = 22$. We tried various numbers of topics, and the results were stable when the topic number was set to 22. Therefore, this is a valid topic number.

5. Results

In this section, we present the results. Firstly, we examine the characteristics of the data before introducing the results of the topic model. Showing the descriptive data without assuming a model is important to check the validity of the topic model.

Figure 1 shows the usage trend of the words “agriculture” and “multiculturalism” in the inaugural speeches. In the State of Victoria, most people live around the state capital Melbourne, and few people are employed in the primary sectors. In other words, referring to

⁹ We conducted text preprocessing by using Quanteda (Benoit et al. 2018).

¹⁰ Stemming might also affect results (Denny and Spirling 2018). However, when we used stemming document-term-matrix, our results did not change (see supplementary material).

agriculture implies representing rural constituencies. On the other hand, referring to multiculturalism implies paying attention to urban people with various backgrounds. In Figure 1, the blue triangles represent the proportion of the speeches by members of the Legislative Council using the words “agriculture” and “multiculturalism” while the red points represent the proportion of the speeches by members of the Legislative Assembly using these words. The white triangle is the counterfactual proportion of the word’s usage by members of the upper house, which is estimated using the trend of speeches in the lower house. According to the figure, there are almost the same downward trends in the usage of the word “agriculture” in both houses, but compared to the counterfactual result, the proportion referring to multiculturalism grows after the reform. Therefore, this result implies that electoral reform does not lead to a decrease in council members’ attention to agriculture. On the other hand, after the reform, politicians pay more attention to an abstract value such as multiculturalism.

[Fig. 1 around here]

5.1 Results of the Topic Model

The results of the topic model are presented in this section. Figure 2 presents words highly associated with each topic, as estimated by the STM. The right panel presents the words that appear in the topic with high probability, and the left panel (FREX) presents the words that appear in the topic frequently and exclusively. It is difficult to interpret based on the words in the right panel because the same words appear in different topics. Therefore, we interpreted the results based on the words in the left panel. Based on the associated words, we labeled the topic names as shown in Table 1.

[Fig. 2 around here]

[Table 1 around here]

In this article, we mainly focus on topics 2, 3, 13 and 15. Topic 2 is labeled as rural water resources and topic 3 is labeled as railway projects. Since topic 15 is associated with the

words, “timber,” “export,” and “production,” it can be interpreted as a topic about the primary industry. These three topics focus on local constituencies.

On the other hand, topic 13 can be interpreted as a topic concerning new policy on the post-industrial society because it is associated with “innovation,” “global,” “science,” “education,” and “creative.”

In addition, topic 17 is related to the electoral reform. One might think that it is about primary industry because it is associated with “greens,” “shooters,” “shooting,” and “fishers.” However, it is not a topic about policy; it is about minor parties and the minor party members’ self-introductions. The word “greens” refers to the party name (Greens), and “shooter” and “fisher” are related to the Shooters and Fishers Party, which advocates for the rights of gun ownership and fishing as a recreational activity. Therefore, increases in topic 17 mean minor parties getting increased representation as a result of the electoral reform, so that it is important to confirm the validity of the topic estimation.

5.2 Causal Effect of the Reform on the Topics

In this section, we show how the electoral reform changed the contents of the speeches. Figure 3 plots the treatment effects of the electoral reform on the topic proportion or prevalence (i.e., τ_k). The point estimates and confidence intervals are calculated by using the function “estimateEffect” and “plotestimateEffect” in the R package *stm*. The x-axis represents the effect size, and the y-axis represents the topic number. The black points are point estimates, and the black bars and the gray bars are 90% confidence intervals and 95% confidence intervals, respectively.

[Fig. 3 around here]

According to Figure 3, the reform did not change the proportions of topics 2, 3, and 15 and caused an increase in topics 13, 17, and 20. In particular, topics 13, 17, and 20 increased by

about 10 percentage points and were statistically significant at the 10% level. The results suggest that the topic of the new economy and hospitals increased in the inaugural speeches after the electoral reform. On the other hand, the point estimates on topics 2, 3, and 15 are nearly zero. These topics do not change after the reform even though the confidence intervals are wide.

We examine the parallel trend assumption on the variation of the topics 2 and 13; Figure 4 shows the trend of the variation for these topics (the left panel shows the result of topic 13; topic 2 is on the right panel). In the figure, the purple points and lines represent the mean proportion of upper house speeches that address the topics before the reform; the green ones represent the mean proportion of lower house speeches that address the topics before the reform; the blue ones represent the proportion of upper house speeches that address the topics after the reform; and the red ones represent the proportion of lower house speeches that address the topics after the reform. The lines are estimated trends assuming linearity. According to the figure, almost the same trends in changes in the proportions occur in both the upper house and the lower house. In addition, after the reform, the trend in the proportion of topic 13 in the upper house changed compared to the expectation of the counterfactual. On the other hand, the trend of topic 2 did not change.

[Fig. 4 around here]

5.3 Summary of the Results and Discussion

As expected, the results of the topic model show that electoral reform led politicians to pay attention to broad policies associated with the words “future,” “creative,” “global,” “innovative,” and “education” in their inaugural speeches. On the other hand, due to low district magnitude (five), the electoral reform did not cause the politicians’ inattention to primary industries and local infrastructures such as timber and water resource issues. As the descriptive statistics show no change in references to the word “agriculture,” the results of the topic model

are valid. In addition to this, the aim of the electoral reform, that is, increasing proportionality, was achieved because the topic associated with minor parties increased.¹¹ The results suggest that legislators depend on party votes to win elections in a flexible-list PR, so that major party politicians tend to advocate policies preferred by their parties, such as economic policies.

Even though it is beyond the scope of this paper, there are differences in some topics between the lower and upper houses before the reform. This might be because the electoral districts of the upper house before the reform were required to cover two electoral districts of the lower house, or because of the different roles played by parliamentarians in the two houses.

6. Conclusion

This article analyzed the effect of electoral reform from an SMD system to a flexible-list PR system on the contents of politicians' speeches by employing a difference-in-differences design and a topic model. From an analysis of the Parliament of Victoria, Australia, the change from an SMD system to a flexible-list PR increased politicians' attention on the future of the state and globalization but did not cause politicians' inattention to their geographical constituencies. Our analysis contributes to the existing literature on electoral reform, which cannot separate institutional and contextual factors, by employing a difference-in-differences design to estimate causal effects.

In addition, while Carey and Hix (2011) claim, in terms of representation and accountability, a PR system with small district magnitudes is an optimal electoral system, our results imply there is no discernible difference in parliamentarians' focuses on geographical

¹¹ Because of the nature of our research design, coefficients for the topics on specific events, such as topic 4, which change similarly in both houses, are nearly zero.

constituencies between a SMD and a PR system with small district magnitude irrespective of ballot structures.

However, we should further examine politicians' policy interests and an actual government's policy choice because the policy outputs are determined by inter-party and intra-party bargaining. Therefore, in future research, we need to examine the interaction of electoral systems and the roles of legislative institutions which translate politicians' preferences into policy outputs.

Because our study only analyzes a small dataset of newcomers in a state parliament, further research should also extend the coverage of the data to include more kinds of legislative speeches. For example, debates on specific bills would enable us to measure to the extent to which parliamentarians deviate from the party line. In future research, we will focus on legislative debates to test the reform, which could enhance the ability of party leaders to enforce discipline, leading to increased unity among parties.

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Table 1. Topic labels from associated words

Topic1	Funding for School	Topic13	Post-industrial Economy and Investment
Topic2	Rural Water Resource	Topic14	Freedom and Religion
Topic3	Railway Project	Topic15	Timber
Topic4	Comments on Specific Commission's Report	Topic16	Health Care
Topic5	Labor Relations	Topic17	Minor Parties Self Introduction
Topic6	Community Service	Topic18	Commonwealth and Federalism
Topic7	Coal Mining and Its Security	Topic19	Individualism
Topic8	Referring to the Former Politicians	Topic20	Hospital
Topic9	Violence and Family	Topic21	Tyranny and Freedom
Topic10	Housing and Privatization	Topic22	Veterans' Affair and ANZAC
Topic11	Food and Fruit		
Topic12	Labor Party		

Figures



Fig. 1. Changes in the frequency of “multiculturalism” and “agriculture”

	FREX							High Prob						
22	damage	picture	troops	advertiser	gallipoli	illness	logging	many	province	mr	one	time	honourable	work
21	dip	barry	free	peter	tyranny	selves	control	years	party	one	also	state	can	thank
20	homes	traffic	beds	concern	hospital	youth	schools	community	many	years	one	members	also	member
19	fortunate	assisted	legal	o'brien	profession	sir	men	member	community	years	also	thank	many	parliament
18	liberal	excellence	commonwealth	duty	federation	robert	compassion	liberal	state	party	also	thank	province	years
17	greens	shooters	mum	voice	sex	fishers	dad	time	party	also	one	like	just	years
16	health	disease	arts	organisations	housing	diseases	drug	health	community	public	many	one	years	services
15	industry	products	ford	timber	costs	production	base	state	industry	years	one	many	also	can
14	liberal	clubs	served	others	church	laws	baillieu	community	many	member	years	life	also	thank
13	innovation	global	dream	science	innovative	creative	thinking	education	can	future	one	must	community	many
12	bracks	secretary	labor	sda	lebanese	alp	union	labor	community	member	thank	also	many	support
11	province	fruit	food	country	dairy	towns	cent	province	many	country	years	also	community	per
10	councils	concerned	labor	government	privatisation	rights	housing	labor	community	local	many	members	parliament	years
9	violence	grateful	aboriginal	paul	greens	stories	acknowledge	thank	many	community	work	also	family	support
8	peacock	lady	gold	millie	mining	november	light	years	first	one	state	thank	parliament	peacock
7	asbestos	electricity	neighbourhood	coal	councillor	hours	journey	years	community	many	work	local	also	like
6	bracks	female	committed	auditor	sizes	access	quality	labor	community	many	local	services	education	support
5	union	electrical	workers	trade	employers	secretary	movement	union	members	time	workers	work	one	labor
4	fitzgerald	report	democracy	queensland	citizens	bjelke	wealth	public	community	can	state	parliament	labor	society
3	rail	facilities	outer	problems	regional	shall	urban	also	many	state	local	members	years	member
2	dairy	farmers	water	nationals	drought	toxic	towns	communities	many	water	community	local	years	support
1	funding	per	school	waiting	language	priority	cent	school	years	per	many	community	education	work

Fig. 2. Words associated with each topic

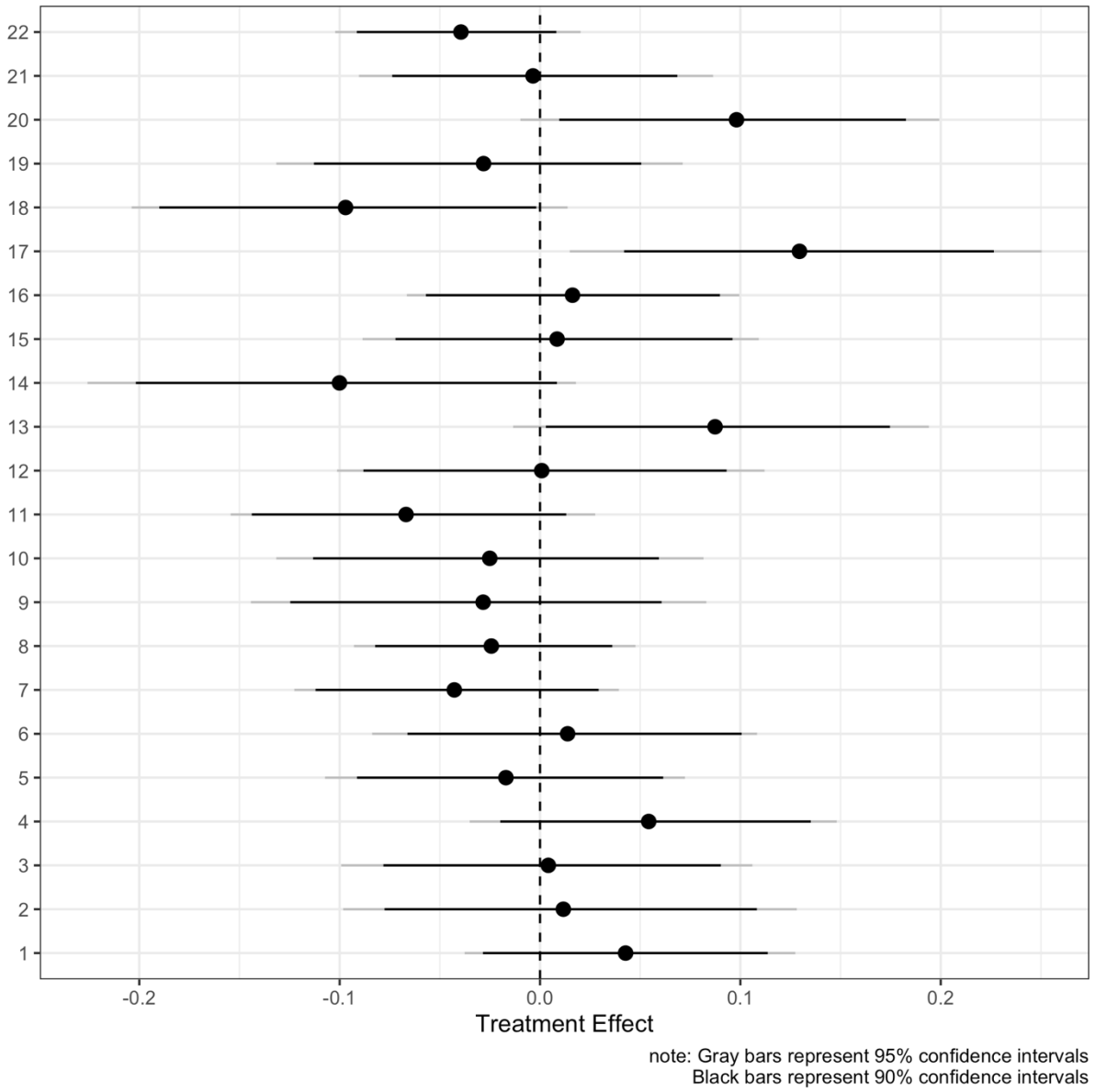


Fig. 3. The causal effect of the electoral reform on topics

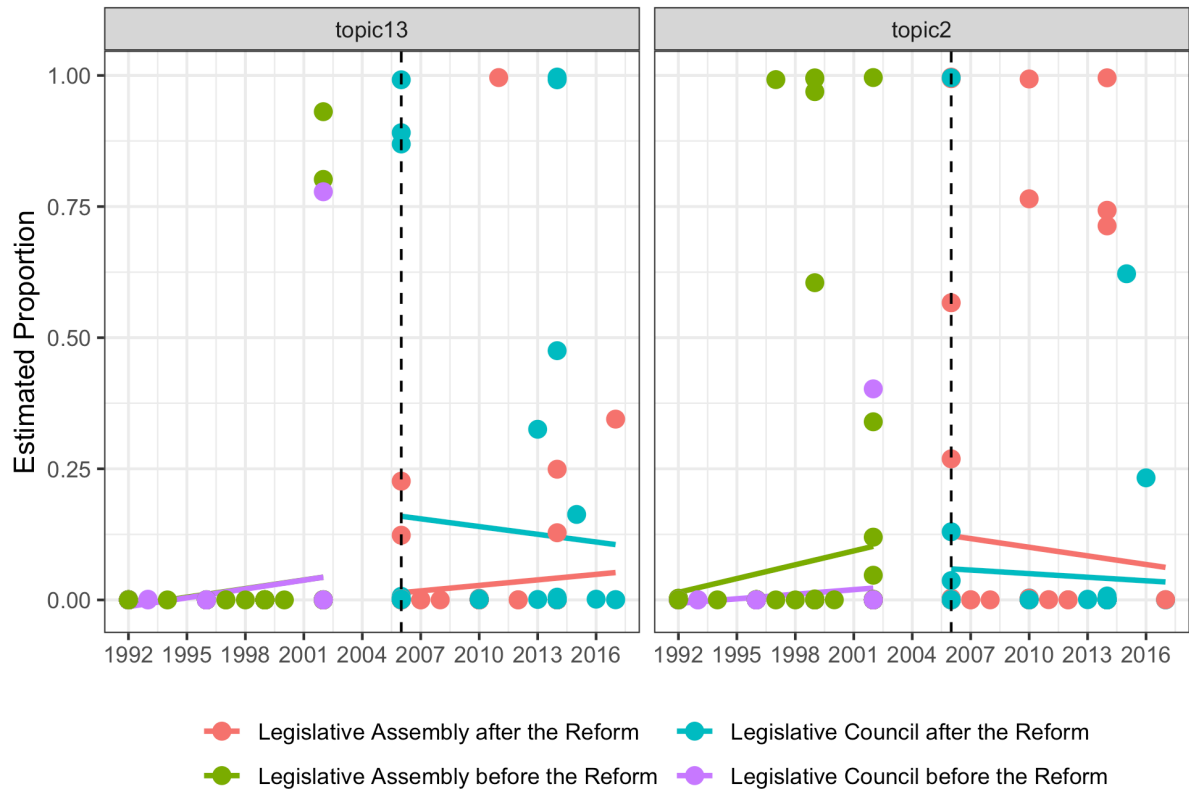


Fig. 4. Trend of topics 2 and 13