Climate Politics in Hard Times: How Local Economic Shocks Influence MPs Attention to Climate Change*

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Abstract

Most countries struggle to implement CO_2 reducing policies. Implementation is politically difficult since it typically forces politicians to trade-off different concerns. The literature on how parties and MPs handle these trade-offs is sparse. We use structural topic models to study how MPs in an oil dependent environment responded to a shock in the oil price that created spatially concentrated costs of climate policies. We leverage the rapid oil-price drop between parliamentary sessions and MPs' constituency adherence in a difference-in-differences framework to identify if MPs respond differently to variation in the salience of trade-offs. We find that MPs facing high political costs of climate policies tried to avoid environmental topics, while less affected MPs talked more about investments in Green energy when the oil price declined. Our results suggest that the oil price bust created a "window of opportunity" for advocates of the "Green shift".

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Introduction

Reducing the pace of climate change is a global public good. Most countries have agreed to reduce CO_2 emissions, but implementing the necessary policies have proved politically difficult. CO_2-reducing policies will create (short-term) winners and losers, and the losers are often spatially concentrated and well-organized, for instance when climate policies harm natural resource extraction (Hovi, Sprinz, and Underdal 2009). Moreover, it is commonly believed that it is more difficult to reduce CO_2 emissions when the state of the economy is declining (Kahn and Kotchen 2011; Scruggs and Benegal 2012; Shum 2012, but see also Bakaki and Bernauer 2018). Mildenberger and Tingley (2019), studying second-order beliefs, find that both the mass public and political elite think that the general public are less supportive of policies to combat climate change than what is actually true, which makes change difficult. However, external shocks, like changes in the oil price, can disrupt equilibriums in energy markets, be important for climate policy and investments in renewable energy, and create a "window of opportunity" for policy change (Unruh 2002; Michaelowa 2005; Aklin and Urpelainen 2013).

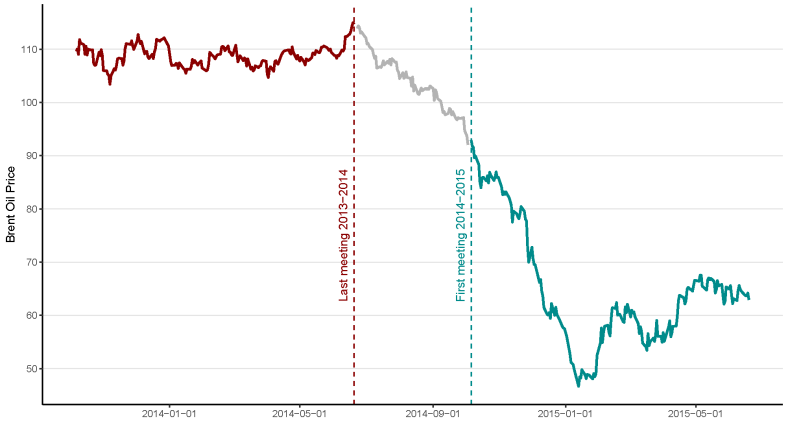
In this paper, we contribute to the small literature on how parties and Members of Parliament (MPs) handle the hard trade-offs they face when addressing climate change (e.g. Schulze 2014; Farstad 2018; Cooper, Kim, and Urpelainen 2018). We exploit variation across time and electoral districts in MPs' incentives to address the climate issue created by the rapid decline in the oil price in 2014-2015. Our context is Norway, which is heavily dependent on oil production and highly sensitive to the oil price. Moreover, MPs operate in a party-centered environment where roll-call voting is determined at the party level, which makes signaling to the home constituency more difficult. Using modern quantitative text analysis methods combined with a differences-in-differences design, we analyze how MPs' speech behavior in Parliament changed in response to the price shock.

Climate politics in hard times

Figure 1 shows the development in the oil price 2014-2015. In early June 2014, the Brent oil price was well above 100 dollars. During the autumn of 2014, the price fell week

by week to below 50 dollars by January 1, 2015, and the price continued to fall until it reached 29 dollars in January 2016. The price decline was dramatic for the oil-dependent Norwegian economy and fear of a major recession loomed large. The consequences were particularly harsh for the county of Rogaland, where the oil sector dominates the economy (see online appendix for details).

Figure 1: Spot crude oil price per barrel in dollars, 2013-2015



Brent oil price during the 2013-2014 and 2014-2015 parliamentary sessions.

We argue that the shock affected the trade-offs MPs had to make between addressing climate change, creating policy incentives to move the economy from oil production to environmentally-friendly industries, and keeping employment levels high. The shock's influence on these trade-offs varies across voters and electoral districts, as the expected costs of CO_2-reducing policies are asymmetric. Bechtel, Genovese, and Scheve (2017) show that this asymmetry is reflected in public support for climate policies, as people employed in extracting industries are less likely to support emission reduction policies. In general, while there is a positive association between global warming and public concern about climate change (Bergquist and Warshaw 2019), public support is pro-cyclical, as support tends to decline when unemployment increases (Kahn and Kotchen 2011; Scruggs and Benegal 2012) and increase with economic growth (Shum 2012). When the expected burden from cuts increases, people become less willing to support them. Environmental policies will also be less salient to voters, and welfare state compensation policies become

more popular when the risk of income loss increases (Margalit 2013; Colantone and Stanig 2018).[1] The spatial concentration of expected costs from implementing environmental-friendly policies will also be important (Stokes 2016; Cooper, Kim, and Urpelainen 2018). When costs are concentrated, it becomes easier to organize and express local resistance.

We know less about how parties and politicians handle asymmetric costs and economic downturns. Climate concerns, as expressed in party manifestos, do not necessarily follow the left-right-dimension (Schulze 2014; Farstad 2018), and spatially concentrated costs can create electoral incentives for MPs that cut across ideological dimensions. For Rogaland MPs, ideological commitments to climate change policies become more costly in political terms when public support for them decline in their home constituency.

MPs from less affected counties, however, might perceive the oil price shock as a "window of opportunity" (Michaelowa 2005). External shocks have been proposed as necessary to exit the "carbon lock-in" that many countries are in (Unruh 2002), and Aklin and Urpelainen (2013) show that investments in renewable energy depends on the international oil price. For an oil-producing country like Norway, it becomes tempting to stimulate green industries and diversify the economy when the oil price is low, since the dependency on one industry becomes very salient to voters. If successful, such investments can create what Aklin and Urpelainen (2013) call positive reinforcement effects, as the Green sector may be permanently strengthened.

MPs in Norway face, however, an institutional problem when they want to send signals to their home constituency. Norway is a party-centered environment, with a decentralized candidate selection system. MPs have few tools available to send credible signals to their constituency and the local selectorate because roll-call voting is determined by party attachment. However, a growing literature shows that parliamentary speeches may, at least to some extent, fill this function (Proksch and Slapin 2012; Lauderdale and Herzog 2016; Ash, Morelli, and Van Weelden 2017). In particular, Baumann (2016) compares cosponsoring of private member bills (PMBs) and speeches, finding that Norwegian MPs are covering a more diverse set of topics with PMBs than in their speeches. This is

[1]The effect of declining earnings might, however, pull in the other direction (see e.g. Barth et al. 2012).

particularly the case for MPs with experience from local politics, and for MPs from larger parties and from larger electoral districts.

Moreover, access to the floor is not constant over time, as party elites tend to restrict parliamentary speech-making to a smaller number of MPs in the run-up to the elections (Bäck et al. 2019). Closely related to our work, Bäck, Baumann, and Debus (2019) and Bäck and Debus (2018) find that MPs from constituencies hit hard by youth unemployment participate less in debates on redistributive policies than their counterparts from less affected constituencies (see also Herzog and Benoit, 2015). Note that we consider change in the content of the speeches that the these MPs deliver, not the number of speeches they participate in on the topic. As such, our findings can be considered complementary as they address to what extent these MPs experiencing a substantive local economic shock change the content of the speeches on relevant topics differently from MPs from less affected areas. Such shifts may help explain shifts in allocation of speech time. MPs from severely hit district change the content of the speeches on relevant topics to a larger extent than MPs from less affected areas. As a result, party leaders may prefer to allocate speaking time on these topics differently. Note however, that the ability of party leaders to decide who gets to speak on a topic is, in the Norwegian context, determined at least partly by committee assignment. Backbench MPs only rarely speak on topics not falling into the jurisdiction of the committee(s) they are assigned to.

Research design

We rely on a data set of all speeches in the Norwegian parliament (Lapponi et al. 2017) and use structural topic models (STM) to estimate how MPs' speech behavior changed when the oil price dropped.[2] The oil price collapsed within an electoral period, which implies that we can study MP behavior before and after the oil price shock for the same set of MPs. Figure 1 shows that the Storting had a recess from June 20th 2014 to October 1st 2014. The break between the two parliamentary sessions serves as a good timing for the treatment period: The price was stable in the 2013-2014 session (the pre-treatment

[2]The online appendix includes details on the data and necessary preprocessing.

period) while during the recess the price started to drop and continued to do so during the second session (the treatment period).

We leverage the option to include covariates into the STM (Roberts et al. 2014, 1067) to embed a differences-in-differences model in the STM.[3] Our set-up allows us to estimate the response of MPs who face different political costs of expressing climate concern, where MPs from the constituency of Rogaland are classified as the treated MPs. The institutional setting (see online appendix for details) implies that we study the same MPs, operating within the same institutional rules and (largely) the same committee composition, in the pre- and post-period, which makes our design very clean. The oil shock was the most important event over this period with a strong geographic component, implying that the DD estimate is unlikely to be confounded by other events.

The STM is a multi-membership model, where each document can load more or less on each topic. The models use the word frequency distribution in a given corpus to classify documents (speeches) probabilistically, and the topic model gives each document a proportion in each topic (topic load). This proportion sums to 1 (or 100%) over all topics for each document (Blei and Lafferty 2009; Blei 2012).

To present the results of the topic model, we simulate the expected topic proportions for each document over all topics. This is done by running a series of 500 regressions where the documents are the units, the proportion each document has in each topic is the outcome, and the covariates are the meta data supplied to the STM. We then extract the mean estimate, 95%, and 90% confidence intervals over all simulations.

The essence of our approach is to examine how the topic loadings correlate with the county of the MP before and after the oil price shock. As discussed above, we expect that MPs from the oil-producing county of Rogaland will be particularly affected by the oil price decline. The oil price shock gives them electoral incentives to shift attention away from environmental issues that will increase the costs of oil production and towards economic compensation policies.[4]

[3]We control for the party of the MP holding the speech in order to exclude party specific effects. This control will not affect the DD estimates since party affiliation is fixed across sessions, but might increase precision.

[4]Clearly, MPs' home constituency is not the only characteristic that might explain

Results

To present the results we filter out the identified topics considered most relevant for our research question (see the appendix for how we filtered the topics). That is, we emphasize the topics regarding oil prices, the oil industry, (renewable) energy, the Norwegian oil fund, and employment/unemployment. We identify three topics out of the 99 topics given by the spectral STM configuration for our main analysis: (1) The Green shift, (2) Renewable versus oil sector, and (3) Unemployment. We interpret these topics as representing debates on investments in green industries (1), reducing reliance on oil production (2), and concerns about the economic downturn (3). We provide illustrations and validation of the content of our selected topics in the online appendix.

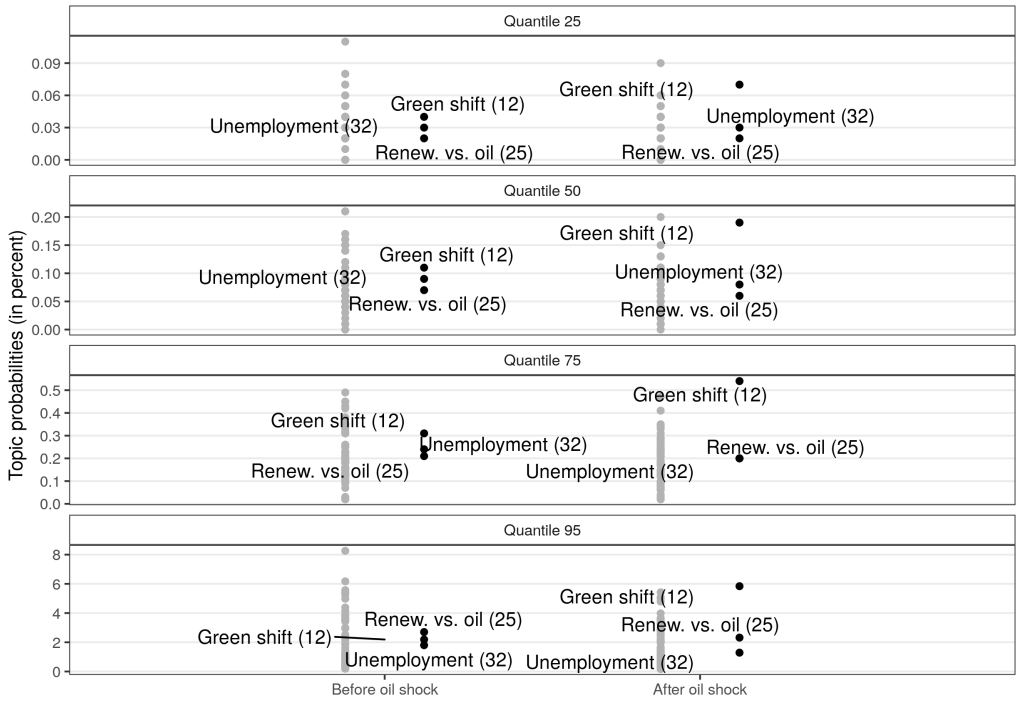


Figure 2: Topic load (%) quantile values before and after oil shock. Grey dots show topics not used in the analyses; black dots show topics used in the analyses.

Figure 2 shows our first important result. The figure plots quantile percent values for the three selected topics compared to the topics left out of the main analyses. The topic

variation in topic attention over time. In Appendix Figure A-5 we study how topic attention changed across the political parties. We do not see strong variation across parties, except increasing attention to renewable energy among MPs from the Green Party and less attention to the unemployment topic among MPs from the Center Party.

model gives each speech a proportion value according to how much of the speech loads on a given topic, so that the sum proportion for each speech over all topics always equals 1 (or 100%). In other words, the figure shows how much our chosen topics are used by MPs in the two periods compared to all irrelevant topics.

We see that the Green shift is the most prominent of our three topics both before and after the oil-shock. Compared to all other topics, however, the Green shift topic becomes one of the most important topics after the shock. For the other of our topics, the changes are smaller. In line with the "window of opportunity"-hypothesis, many MPs responded to the oil price drop not by avoiding environmental issues, but by exploiting the oil price shock as a way to advocate for more investments in policies that shift the Norwegian oil dependent economy towards Greener industries. Since this implies investments in industries that has a high demand for engineers, a group of workers that suffer when the oil price drops, the Green shift can be framed as an active response to the recession.

While MPs in general did not avoid environmental issues as the oil price collapsed, the MPs from Rogaland might consider it more risky to address environmental topics. Figure 3 visualizes our main results from the differences-in-differences analysis, while numerical estimates are presented in Table 1. We find a clear regional variance in speech patterns in the pre-period, which indicates that although the party label determines roll-call voting, MPs can send signals home through their speeches in the parliament.[5] In the pre-period, the representatives from Rogaland were, unsurprisingly, among the most active MPs on the oil-related topic, but do not stand out from the other MPs on the two other topics.

In the post-treatment period, we find that MPs from Rogaland did not change how much they talk about the Green shift. This stability, however, is in a context where MPs from other counties increased their emphasis on this topic significantly. This difference in behaviour between Rogaland MPs and MPs from other counties produce a negative DD-estimate. The DD estimates and associated uncertainties are presented in bold numbers in Table 1. The deviant behavior of MPs from the Rogaland bench is consistent with the

[5]The magnitudes might seem small, but recall that there are 99 topics and the STM is a multi-membership model. If a speech tapped into all topics equally, the topic loadings would be at about 1%, which makes difference estimate of 1% quite important.

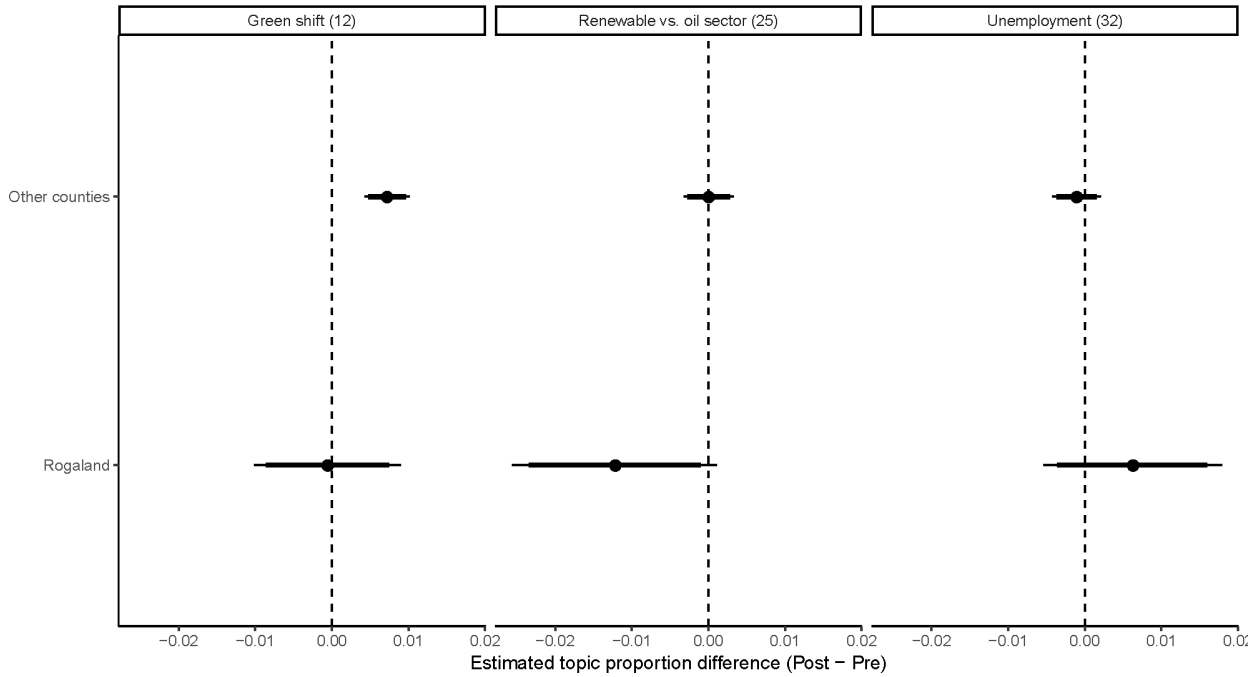


Figure 3: Expected topic proportions over selected topics for Rogaland compared to all other counties. The thick line through the dot shows 90% confidence bands and the thin line 95% confidence bands.

higher costs of participating in the Green shift debate. We interpret the DD-estimate as reflecting that MPs outside Rogaland used the oil price bust as a "window of opportunity" to promote the Green shift. This interpretation is strengthened by a number of the full quotes from the speeches, which are reported in the online appendix.

The pattern is even stronger for the topic that specifically includes reference to the oil industry. While Rogaland MPs talked much about this topic before the oil price bust, they shifted strongly away from it after the shock. Panel C shows that they instead talked more about unemployment, consistent with the increasing unemployment rate in their electoral district – although this effect is only significant at the ten percent level.

In the online appendix we present three additional results. First, we show that a "placebo"-analysis where we do a similar type of analysis for the previous Storting (i.e. four years earlier) show no significant differences. This result reduces the worry that we simply pick up random noise or a trend in speech patterns. Second, we present an analysis where we in rotating fashion treat each of the control counties as the affected counties. This analysis show that Rogaland clearly stands out from the others. Third, we include

committee fixed effects to examine whether results are similar if we account for a small number of exogenous changes in committee membership. We find that the DD-estimate for the Green shift declines somewhat, but that the main conclusions remain.

Table 1: Estimated topic proportions before and after the oil price shock. Rogaland and average across other counties. DD-estimate in bold.

	Rogaland	Other counties	Difference
	A: Green shift		
Before	.85	.75	.10
	(.25)	(.07)	(.26)
After	.79	1.46	-.67
	(.22)	(.07)	(.23)
Difference	-.06	.72	**-.78**
	(.34)	(.10)	**(.35)**
	B: Renewable versus oil sector		
Before	2.35	1.01	1.33
	(.37)	(.09)	(.38)
After	1.13	1.01	.12
	(.28)	(.08)	(.29)
Difference	-1.22	.00	**-1.22**
	(.47)	(.11)	**(.48)**
	C: Unemployment		
Before	.90	1.01	-.11
	(.29)	(.08)	(.30)
After	1.53	.90	.63
	(.28)	(.07)	(.29)
Difference	.63	-.11	**.74**
	(.40)	(.11)	**(.42)**

Note: Standard errors in parentheses.

Conclusion

Reducing CO_2 emissions is difficult. It is usually assumed that it is more difficult if the economy is in decline, if expected costs are spatially concentrated, and if the economy is heavily dependent on industries with high CO_2 emissions. In such settings, MPs have

to trade-off a range of various concerns. The literature on how they do so is, however, scarce. While most of the literature relies on cross-country comparisons, which typically have well-known problems of internal validity, we leverage a rapid decline in the oil price to study how Norwegian MPs respond to the concerns produced by the looming recession.

We find that MPs from the electoral district most reliant on oil-production indeed tried to avoid environmental topics, and shifted their speech time towards employment topics. MPs from other districts, however, behave as if they used the oil price bust as a "window of opportunity" to talk about more investments in greener industries. In contrast to the conventional wisdom, hard times can thus spur climate friendly policy shifts, but this will depend on the geographic concentration of affected industries. One important limitation of our paper is that we cannot tell to what extent the behavioural change reflects MP agency or coordinated party strategies that we do not observe.

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Online appendix

The effects of the oil price across regions

For a small open economy which is heavily dependent on oil production, the rapid price decline quickly affected the real economy. To illustrate, the reported number of employees affected by planned layoffs and dismissals increased from 23 845 in 2014 to 49 498 in 2015 and remained at the a high level (50 019) in 2016.[6] The index of new orders in manufacturing fell from 135 in mid-2014 to 117 in mid-2015 and 98 in mid-2016, which is a substantial drop. Compared to the same quarter the year before, the index fell in all quarters from Q3 2014 to Q3 2016 (Statistics Norway). According to estimates from market analysts, more than 30 000 jobs were lost in the oil- and oil-related sectors from 2014 to early 2016.

The county of Rogaland is particularly dependent on oil and its main city Stavanger is the oil capital of Norway. Figure A-1 illustrates how the shock hit Rogaland harder than other parts of the country. The top left figure shows the number of planned layoffs in Rogaland and in Oslo. Despite the fact that Oslo has a larger population, the raw number of workers affected by layoffs was much higher in Rogaland during the oil price bust period. The top right and bottom left figures show the development in the unemployment rate[7] and the number of persons on active labour market programs (ALMP). While the unemployment rate is declining slightly in Oslo from 2014-2016, it is almost doubling over the same period in Rogaland. The development in the number of persons on ALMPs is more similar, but the increase is larger in Rogaland.

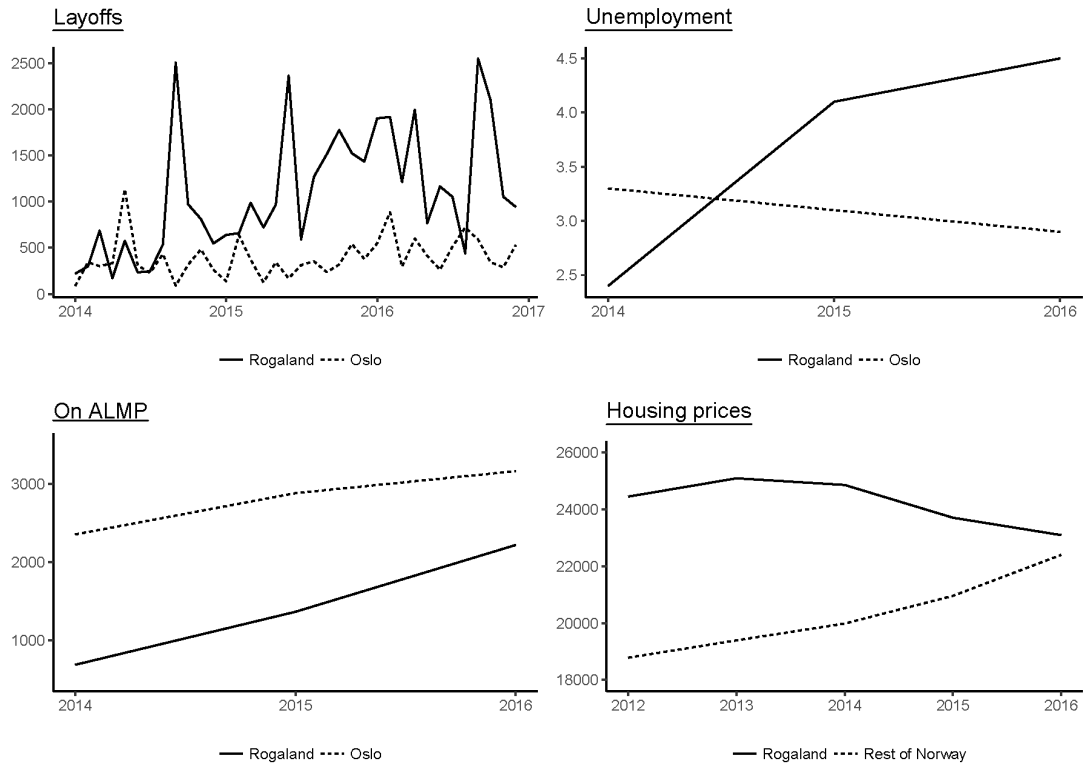
Finally, the figure in the bottom right corner shows the development in the housing prices in Rogaland versus the average in the rest of Norway.[8] The development in the housing market might be viewed as a better measure of the shock than the unemployment

[6]Employers are obliged to report planned mass dismissals to the Norwegian Labour and Welfare Administration (NAV).

[7]The unemployment rate is measured in November each year, as reported by Statistics Norway.

[8]The numbers are the average prices (in NOK) per square meter for re-sale of single houses. We compare the housing market in Rogaland with rest of Norway except Oslo because of a "boom-like" situation in the Oslo housing market.

Figure A-1: The impact of the oil price shock on Rogaland



figures because it will also capture that many workers had to accept wage cuts to not lose their job, or to accept a new job with lower pay than their previous job if they move out of unemployment. The figure shows a strong decline in the housing market in Rogaland, while the average price increased in the rest of Norway.

The 2016 government budget reflects the negative impact on Rogaland. The government decided a spending package of 4 billion NOKs to boost demand in the most affected areas. The spending package involved increased investments in local infrastructure, such as roads, railroads, and tunnel safety, and most of the funding where targeted at Rogaland.

Institutional setting

Parliamentary debates

The president of the parliament organizes the parliamentary debates, as s/he proposes the maximum duration of the debate and how to allocate the time amongst the parties. [9]

In general, the rapporteur is given the floor first. Then, speakers are given the floor in the order that they are recognized by the president. If two MPs request the floor simultaneously, the president determines who should take the floor first. If the parties have submitted list of speakers to the parliament administration before the debate, the president will use these lists to decide the order of speakers. The party leadership can thus limit an MP's floor access by not including the name on this list. One speaker from each party tops the list. In general, MPs are not given the floor more than twice per debate.[10]

An MP's first speech in a debate is limited to maximum 30 minutes, the second to 10 minutes. Any subsequent speeches are limited to 3 minutes. In addition, short responses limited to 1 minute are allowed.[11] At the end of the debate, the president may open for a short exchange of comments and clarifications, limited to one minute each, and up to twice per MP. Each speech must be addressed to the president and be strictly on the topic of discussion. Lengthy quotes, inappropriate or offensive language is not allowed. Those present in the room are not allowed to utter sounds of support or opposition during the debates.

[9] Parliamentary debates in Norway are regulated under paragraph 51 of the rules of procedures.

[10] This rule does not apply to the rapporteur, the prime-minister, and the leaders of the parties. Also, the president is allowed a short comment and may allow one speaker from each of the parties to speak more than twice. The president may also propose to the plenary to deviate from this rule. Finally, the plenary can, by two-thirds majority, close the debate before all MPs who have requested to speak have been given the floor.

[11] The plenary can, after a proposal from the president of ten MPs, adopt shorter maximum times, but not shorter than 3 minutes.

Committees

In the Norwegian parliament, each member is assigned to only one committee at the start of the parliament. MPs serve on the assigned committee for the whole duration of the parliament, unless they are appointed to ministerial posts, and therefore vacant their seat in the parliament, or their party need to re-assign their committee-members for strategic or practical reasons. However, most MPs serve in the same committee for the whole parliament.

Perhaps the most important committee for our paper is the workings of the Energy and Environment committee.[12] It is hence useful to examine the composition of this committee, listed in Appendix Table A-1. The composition of the Energy and Environment committee reflects the principle that the committees should reflect the party composition of the plenary. There is no similar norm or pattern of geographical representation. Oslo (the county with the most representatives) is the only county with three committee members throughout the whole parliament. Nordland, despite only having nine MPs, has two members of the committee for the duration of the parliament. This is noteworthy as it is the county of one of the most contested areas for potential new oil exploration, namely the area around the picturesque Lofoten, where fishing interests and the tourist industry has teamed up with environmental interests.

The county of Rogaland had 14 out of the 169 representatives during the 2013 - 2017 parliament. Only two of these representatives changed committees. Roy Steffensen from the Progress Party left the Committee for Education and Research in October 2015 to join the Committee of Finance and Economic Affairs. Geir Pollestad from the Center Party left the Energy and Environment Committee in April 2014 to chair the Business and Industry Committee. The departure of Pollestad occurred just a couple of months before the collapse in the global oil price. He was replaced on the committee by Marit Arnstad, who had just been elected as head of the parliamentary delegation for the Center Party.

[12]Other key committees include the Committee of Finance and Economic Affairs and the Committee of Labour and Social Affairs.

Table A-1: Composition of the Energy and Environment committee

Position	Name	Party	Dates	County
Chair	Elvestuen, Ola	V	22.10.2013-30.09.2017	Oslo
1^{st} vice-chair	Aasland, Terje	A	22.10.2013-30.09.2017	Telemark
2^{nd} vice-chair	Astrup, Nikolai	H	22.10.2013-18.12.2015	Oslo
2^{nd} vice-chair	Bru, Tina	H	21.01.2016-30.09.2017	Rogaland
Member	Aarbergsbotten, Torhild	H	18.12.2015-30.09.2017	Sør-Trøndelag
Member	Aasland, Terje	A	17.10.2013-22.10.2013	Telemark
Member	Arnstad, Marit	Sp	22.04.2014-30.09.2017	Nord-Trøndelag
Member	Astrup, Nikolai	H	17.10.2013-22.10.2013	Oslo
Member	Aukrust, Åsmund	A	17.10.2013-30.09.2017	Akershus
Member	Bru, Tina	H	17.10.2013-20.01.2016	Rogaland
Member	Eide, Rigmor Andersen	KrF	17.10.2013-30.09.2017	Møre and Romsdal
Member	Elvestuen, Ola	V	17.10.2013-22.10.2013	Oslo
Member	Fredriksen, Jan-Henrik	FrP	17.10.2013-30.09.2017	Finnmark
Member	Grimstad, Oskar J.	FrP	17.10.2013-20.01.2016	Møre and Romsdal
Member	Hansen, Eva Kristin	A	17.10.2013-30.09.2017	Sør-Trøndelag
Member	Hansson, Rasmus	MDG	17.10.2013-30.09.2017	Oslo
Member	Henriksen, Odd	H	17.10.2013-30.09.2017	Nordland
Member	Henriksen, Per Rune	A	17.10.2013-30.09.2017	Hordaland
Member	Holmås, Heikki Eidsvoll	SV	17.10.2013-30.09.2017	Oslo
Member	Korsberg, Øyvind	FrP	20.01.2016-30.09.2017	Troms
Member	Ljunggren, Anna	A	17.10.2013-30.09.2017	Nordland
Member	Milde, Eirik	H	17.10.2013-30.09.2017	Østfold
Member	Pollestad, Geir	Sp	17.10.2013-22.04.2014	Rogaland

Data and preprocessing

Data

We rely on the Talk of Norway dataset (Lapponi et al. 2017) to examine whether speeches are different in the treatment session. The dataset consists of all speeches in the Storting from 1998-2016, appended by a large set of metadata variables and automatic linguistic annotation of the speeches.[13] The data is openly accessible from the Talk of Norway Github repository, with accompanying packages for both Python and R.[14]

Preprocessing

We use the automatically annotated speech files that come with the Talk of Norway corpus for text normalization. More specifically, we use lemmatized words combined with parts-of-speech tags.[15] We also include both lemma unigrams and lemma bigrams in our estimation, allowing us to relax the assumption that word order is ignorable.[16]

We use standard tools in text analysis such as removing punctuation, lowercase all characters, remove stop words, exclude 490 speeches because they are shorter than 20 lemmas and all lemmas used in less than five documents. We thus remove data not contributing to topics differentiation. Doing so significantly decreases computational time.

Table A-2 shows some descriptive statistics of the speeches used in our main analysis.

The results from any topic model is the result of the text and the number of topics selected. The number of topics determine the coarseness of the different topics recovered by the model. When the number of topics is set very high, we risk that each topic is very particular to one or a handful of speeches. Then speeches by different speakers on

[13]These are obtained through the Oslo-Bergen tagger (Johannessen et al. 2012). This tagger provides sentence and token boundaries, parts of speech, morphological features, and lemmatized tokens.

[14]See `https://github.com/ltgoslo/talk-of-norway`.

[15]A lemma parts of speech unigram of the word "houses" is, for example, indexed as "house:noun" in our application

[16]With unigrams, all words are seen as independent from its neighbors; the words basically has no context in the analysis. Bigrams relax the bag-of-words assumption slightly by introducing word pairs ("political party" is here regarded as one token, whereas it would be two in a unigram approach). Our main analyses shows only results with combined lemma bigrams and unigrams.

Table A-2: Descriptive text statistics for MPs in the data over counties.

	County	N MPs	N speeches	Speeches/MP
Akershus	17	1320	77.65	379.10
Aust-Agder	5	397	79.40	344.77
Buskerud	11	975	88.64	372.10
Finnmark	7	505	72.14	299.84
Hedmark	8	1152	144.00	299.85
Hordaland	16	1505	94.06	319.69
Møre og Romsdal	11	777	70.64	302.13
Nord-Trøndelag	6	647	107.83	295.53
Nordland	10	523	52.30	326.71
Oppland	8	715	89.38	307.00
Oslo	18	2452	136.22	331.83
Østfold	11	514	46.73	326.20
Rogaland	13	1212	93.23	321.68
Sogn og Fjordane	5	528	105.60	297.21
Sør-Trøndelag	11	851	77.36	299.60
Telemark	6	473	78.83	342.68
Troms	6	603	100.50	303.25
Vest-Agder	7	443	63.29	341.81
Vestfold	8	475	59.38	341.38

substantively the same topic may be classify as different topics due to particularistic choice of a small number of words that are irrelevant for the substantive content of the topic. In parliamentary debate settings, a very high number of topics may separate speeches on the same substantive topic by party. Moreover, a very high number of topics may also identify each debate on same substantive topic as a different topic with distinguishing features that are very particular to a particular debate. In contrast, if the number of topics is set too low, then we risk that topics that are substantively different are merged together. Then the result is that the topics do not make substantive sense. Within the field of Natural Language Processing (NLP) several measures have been develop to evaluate to what extent topics are coherent within themself and distinguishable from other topics. It is such methods that we relied on for initially selecting the number of topics for our analysis. In short, we let the data decide the topic structure in the Parliament. This is implement in STM through the *spectral* configuration (Roberts, Stewart, and Tingley 2016, 83). This approach resulted in 99 topics. After carefully investigated the content

of these topics, we decided that there was no need to select a different number of topics for our analysis, as the topics made substantive sense and clearly distinguished between different topics. In addition, we estimating the model with the number of topics ranging from 90 to 110, all the topics that we focused on in this analysis were identified as different topics. When setting the number of topics a lot lower, we saw that several of the topics that we have good theoretical reasons to treat as different were mashed together into substantively heterogeneous topics. When we set the number of topics a lot higher than 99, we saw that very similar speeches given by different people or at different point in time were treated as different topics altogether. As a result, we decided that there was no good reason not to report the results from the data-driven exercise of picking the number of topic. Note however, that in these models there is no such thing as *the correct* number of topics. Below, we provide the reader with illustrations of the topic content.

Illustrations of topic content

We validate our main three topics and their content in various ways to be sure that they capture what we are looking for. Because our model sets 99 unique topics, our first task was to zoom in on the potential topics we were interested in. We roughly labeled all topics based on the top 10 loading words, and suplemented by reading some top texts if in doubt. All topics consisting of procedural language and dominated by the secondary Norwegian language, *Nynorsk*, were disregarded.

For the substantive topics remaining, we searched for keywords in the top 100 loading words (FREX) for each topic. For example, using the keyword "environment" yielded 3 topics (12, 23, and 96). Topic 23 turned out score high on words related to the fish industry, something the top texts of that topic also reflected. Topic 96 gave words about environmental academic research, also reflected in the top texts for that topic. And, topic 12 gave top words related to shifting the economy from industries with high levels of CO2 emissions to environmental-friendly industries ("the Green Shift"). Then we did the same process for other related keywords, such as "green", "climate", and so on, until we were confident on which topic reflected the "Green Shift". Next, we also wanted to include topics for the development of the oil industry. Here, we started by simply searching for the keywords "oil" and "gas". This only gave one hit: topic 25. We then expanded the search by using keywords such as "energy". This gave a second candidate: topic 84. But, by further inspection this topic was a bit more vague than topic 25, and was mainly about the Norwegian pension fund (revenue from the oil sector which is invested around the globe for future generations' benefit). Last, we wanted to look at the effect of the shock on how MPs spoke about the work force, and unemployment in particular. Here, we started the keyword search with "unemployment". This gave one topic: topic 32. In order to make sure this was the right topic, we also expanded this search with keywords such as "lay off", "work", and more. This gave four additional topics: 4, 9, 17, and 76. Topic 4 was pre-labeled as a *Nynorsk* topic and topic 9 as a procedural language topic. Topic 17 loads highly on a hot debate in Norway over the 2010s – temporary work contracts. Finally, topic 76 consist of speeches on government benefits such as parental

leave, disability benefits, and unemployment benefits.

Below, we show 1) the top loading words, 2) top loading texts, and 3) and validation through external keywords for the three topics we eventually picked out for analysis.

Top words. Figure A-2 shows the top 10 loading words (in Norwegian and English) for our three main topics over four different ways of measuring the importance of words in topics. *Prob* shows the raw probability loading of a word in a given topic, *Lift* divides the topic-word distribution by the word count probability distribution , *FREX* balances the frequency of a word in a topic and how exclusive it is for that topic compared to other topics, and *Score* also accounts for the probability loading a word has across all topics by dividing the log frequency of the word by the log frequency over all topics (see Roberts et al. 2019 for more information).

	Norwegain	English	Norwegain	English	Norwegain	English
	Green shift (12)		Renewable vs. oil sector (25)		Unemployment (32)	
Prob	måtte	had	industri	industry	industri	industry
	norge	norway	sokkel	shelf	næringsliv	business
	stå	stand	utbygging	development	regjering	government
	stor	great	produksjon	production	tiltak	measures
	stor utfordring	great challenge	norsk	norwegian	ledighet	vacancy
	grønn	green	gass	gas	bedrift	business
	stå overfor	stand opposite	fornybar energi	renewable energy	norsk økonomi	norwegian economy
	framover	forward	olje	oil	norsk	norwegian
	overfor	opposite	fornybar	renewable	økonomi	economy
	utfordring	challenge	energi	energy	situasjon	situation
Lift	grønn omstilling	green restructuring	johan sverdrup	johan sverdrup	øke ledighet	increase vacancy
	mye klimavennlig	much environmentally friendly	installasjon	installation	mye oljepenger	much oil revenue
	stå foran	stand front	norsk leverandørindustri	norwegian industry	permitteringsregelverk	layoff regulations
	grønn	green	vindkraft	wind power	permittering	layoff
	stå overfor	stand opposite	vannkraft	hydroelectric power	permitteringsregle	layoff rules
	klimautfordring	climate challange	områdeløsning	optimal solution for the area	permittere	lay off
	skifte	change	oljedirektoratet	the Norwegian petroleum directorate	lav ledighet	low vacancy
	overfor stor	opposite great	petroleumspolitikk	petroleum policies	permitteringsordning	layoff scheme
	grønn skifte	green change	twh	twh	øke arbeidsledighet	increase unemployment
	grønn vekst	green growth	havvind	offshore wind	øke oljepengebruk	increase oil revenue spending
Frex	stor mulighet	great opportunity	sverdrup	sverdrup	permittere	lay off
	klimautfordring	climate challange	olje	oil	permittering	layoff
	år framover	years forward	johan	johan	finanskrise	financial crisis
	framover	forward	vindkraft	wind power	oppsigelse	termination
	overfor	opposite	energi	energy	miste jobb	lose job
	grønn skifte	green change	norsk sokkel	norwegian shelf	oljepengebruk	oil revenue spending
	stor utfordring	great challenge	gass	gas	norsk økonomi	norwegian economy
	skifte	change	sokkel	shelf	arbeidsledighet	unemployment
	grønn	green	fornybar	renewable	permitteringsregelverk	layoff regulations
	stå overfor	stand opposite	fornybar energi	renewable energy	ledighet	vacancy
Score	klimavennlig	environmentally friendly	fossil energi	fossil energy	oljepenger	oljepenger
	se	see	vindkraft	wind power	permittering	layoff
	stor utfordring	great challenge	fossil	fossil	permittere	lay off
	klimautfordring	climate challange	gass	gas	miste jobb	lose job
	grønn vekst	green growth	energi	energy	øke oljepengebruk	increase oil revenue spending
	mulighet	opportunity	norsk sokkel	norwegian shelf	oljepengebruk	oil revenue spending
	stå overfor	stand opposite	olje	oil	arbeidsledighet	unemployment
	skifte	change	sokkel	shelf	norsk økonomi	norwegian economy
	grønn skifte	green change	fornybar energi	renewable energy	permitteringsregelverk	layoff regulations
	grønn	green	fornybar	renewable	ledighet	vacancy

Figure A-2: Top 10 tokens for the three analyzed topics over four measures of importance.

Top speeches. As a further validation of the topic contents, we als show the top three loading speeches from each of the main three topics used in the analysis. That is, the speeches that have the highest amount of words associated with these topics. The speeches below are translated using Google Translate, in order to not introduce any bias from the authors. We have, of course, also read more of the top texts (around top 20 for each

topic) in order to be certain we capture the correct concept here.

Green shift:

1. Rigmor Andersen Eide (Christian Democratic Party – 0.84 topic load):

> I am glad that the partnerships have started the green shift together. It is therefore important in the future to be concrete. There is much talk about the transport sector – about road and rail. But the maritime sector – which I would like to point out – can in future take a significant share of the reduction in emissions and can take a globally leading role in green shipping and the green shift. Developing a cleaner shipping business is like a triple benefit with a triple gain: It is good for the environment, it is good for Norwegian value creation, and it will be profitable. Norway should have a vision of establishing the world's most efficient and environmentally friendly sea transport in Norwegian waters. The average age of Norwegian ferries and speedboats is close to 30 years, and many of them are pure emission bombs. My question is: Will the government use this opportunity – at a time when parts of the maritime industry are struggling .- to encourage, through offensive measures, a green shift by renewing the ferry and speedboat fleet?

2.Pål Farstad (Liberal Party – 0.71 topic load):

> A month ago I was with Trine Skei Grande visiting Norsk Maritimt Kompetansesenter in Ålesund. NMK houses well over 800 high-skilled jobs in the maritime sector. Our main message was that they were ready to take a leadership role for new environmentally friendly technology and to take a leading position in the new growing green market - nationally and globally. In short: They care about future. But to achieve this, they are dependent on some national measures, including that ferries, coastal freighters and speedboats should have zero emissions by 2030 and that we will put in place a tendering regime for zero-discharge technology for new ferry tenders as soon as possible, preferably by 2016. These are measures that do not cost money, but which require political leadership, about daring to invest in the green shift instead

of yesterday's solutions and technology. So my question to the Prime Minister is the following: Will the Prime Minister join the maritime industry to bring about the green shift?

2.Trine Skei Grande (Liberal Party – 0.71 topic load):

I think it is very important that we dare to take into account the consequences of a green tax commission. Then we have to actively use our tax and duty systems to make those adjustments, make it profitable for people to choose the green solutions and make it attractive for people to opt out of those that have negative consequences. I believe that we must be able to use our tax and duty systems actively to bring about green growth. Then we have to turn our business from the oil-dependent business we have in your constituency. We must be able to turn that competence into new energies, more forward-looking energies and achieve growth in the green sectors in the future. This is the restructuring Norway is going through. It's going to be painful and big, and we need to be able to use our tax and duty system actively to achieve that. It is perhaps one of the means I think will work best.

Renewable versus oil sector:

1. Tina Bru (Conservative Party – 0.81 topic load):

Norway's history as an oil and gas nation is in many ways an adventure. Up to the 1970s, GDP per capita in Norway was below the average in Western Europe. After that time, Norway has experienced significantly faster and more stable growth than most other countries. While economic growth has gone up and down in most other industrialized countries, it has almost only gone up and down in Norway. After Norway's new future as an oil nation had become a reality, what was to become known as the Ten Oil Commandments was written in 1971. Already in this early phase of our new role as an oil and gas nation, we fortunately had foresighted politicians in the Storting's industrial committee who knew what kind of significant responsibility our gold discovery

under the sea brought. The first oil Commandment states: "That national governance and control must be ensured for all activities on the Norwegian continental shelf." This is an important principle, which Norway has adhered to since the start of the oil adventure. Through the establishment of the Norwegian Petroleum Directorate and Statoil in 1972, Petoro and Gassco in 2001, as well as the Petroleum Safety Authority Norway in 2004, the desire for full national governance and control has been fulfilled. The government is committed to preserving and strengthening the state's ability to secure the greatest possible value creation from our fossil resources. This is precisely why the government is strengthening both the NPD and Petoro in this budget. In this way, the NPD's opportunity to contribute to the work on increased recovery is increased and Petoro's opportunity to follow up the state's ownership interests, especially aimed at measures in existing fields, is better. Increased recovery and continuous investment are necessary for us to maintain a steady level of activity over time. Fortunately, there is broadly a consensus on the importance of, and the direction for, the Norwegian petroleum industry. The ten oil Commandments still remain as a map for the road ahead. This is good, because predictability and long-term visibility are very important for this industry. The petroleum industry is the engine of the Norwegian economy. 250,000 people are employed directly or indirectly here. The state derives one third of its revenues from this - almost NOK 350 billion for 2013. There is no doubt that Norway, as we know it today, would have looked very different without the oil and gas industry. Some would argue that we must phase out and shut down the Norwegian petroleum industry in order to fight the world's climate change. I think climate change is something we must take very seriously. Norway must also do its part and have a responsibility. But I do not agree that the closure of Norwegian oil and gas business is the solution to the problem. The climate challenges must be viewed from a global perspective. The world has a growing need for more energy. More and more people are being lifted out of poverty,

and more and more countries are experiencing economic growth. I believe our petroleum industry is an important contribution to solving the world's energy and climate challenges. Already in 1971, we were concerned about environmental considerations in oil policy. The fourth oil Commandment states: "That the development of an oil industry must take place with due regard to existing business activities and nature and environmental protection". We have been concerned about this ever since. The Norwegian continental shelf is responsible for the world's most climate-friendly oil and gas production. Emissions per produced unit of oil and gas from the Norwegian continental shelf are significantly lower than from other countries' petroleum provinces. This has not happened by itself. There is considerable willingness for restructuring and the ability to develop new and more environmentally friendly technology behind this. Norwegian gas production, precisely because of good technology, is considerably more environmentally friendly than gas production in many other parts of the world. That is why it is important that we increase our efforts in research so that we can continue to use our oil wealth to develop new technology that will help the world reach its climate goals. In this budget, NOK 36 million is more for petroleum research, which is a good start. Less access to oil and natural gas is likely to lead to increased use of coal in many countries. The IEA states that in the green scenario for the future, the energy mix will also have a significant impact on fossil energy. The question is, first and foremost, what proportion will come from coal or from oil and natural gas. Norwegian petroleum activities are part of the solution. This does not mean that we should not invest in renewable energy and other environmentally friendly solutions. This is not about either-or, but it is about both-and.

2. Anna Ljunggren (Labor Party – 0.79 topic load):

Through our 40-year history of oil and gas, we can refer to an industry that now indirectly employs 250,000 people and accounts for 29 per cent of the state's revenue. We have managed the resources for the good of the commu-

nity. Norwegian oil and gas policy has been characterized by predictability, profitability and continuous access to new areas, but at an appropriate pace that will allow resources to last for decades to come. A steady pace of correct activity is important for the supplier industry. Simply put, one can say that neither a too high tempo nor a slow tempo is good for Norwegian workplaces. Norway is and has always been a stable and predictable supplier of oil and gas. This is a competitive advantage today. Gas can unite the European targets for delivery-safe energy and reduce greenhouse gas emissions. If coal is replaced by gas in electricity production in Europe, this alone will hardly meet the EU's CO2 targets. Gas needs to replace coal, then we have a chance to reach the targets. Now the oil and gas activities are being moved north, so that the region I come from can also take part in the oil adventure. For the Labor Party, it is important that we make sure that the oil industry is given access to new areas, while still meeting the world's most stringent environmental requirements. Although the industry is gradually moving north, efforts must also be made to increase recovery from already existing fields. The oil and gas business on the Norwegian continental shelf is a pillar in the Norwegian economy. The business has provided ripple effects in the form of jobs across the country. It has contributed to business development, technology development and social development that has benefited the entire country. The background to the proposal we are currently considering is a desire to reduce Norwegian oil and gas production. Coincidentally, we would like to consider the proposal of the Green Party on World Environment Day. Fossil energy sources account for about 80 per cent of the world's energy supply and are the main cause of greenhouse gas emissions and anthropogenic global warming. Oil alone equals one third of the world's energy consumption. I agree with the Green Party and Rasmus Hansson that extensive changes in energy use are necessary if harmful climate change is to be avoided. But even in the IEA's two-degree scenario, fossil fuels cover two-thirds of energy consumption in 2035. Oil and

gas are an essential part of the global energy mix for the foreseeable future. One of the most important measures that could lead to lower CO2 emissions is increased production of renewable energy. Energy efficiency measures must be implemented, we must replace coal with gas, and we must develop methods for capturing and storing CO2. The Storting's overall goal, most recently addressed in the petroleum report, is that Norwegian petroleum policy must be characterized by long-term prospects and predictability for continued value creation on the Norwegian continental shelf. At the same time, it is important that the focus is constantly on the environment and safety in order to ensure good and sustainable resource management. Canceling the allocation of new blocks in the 23rd licensing round is not considered to be predictable policy and in line with the Storting's goals for petroleum policy. The Labor Party will therefore vote against the proposals of the Green Party and the Environment Party.

3. Rigmor Andersen Eide (Christian Democratic Party – 0.78 topic load):

Thanks to the interpellant who raises this theme and clearly points out the impatience and pervasive pessimism that is in the offshore wind environment. We have the legal framework clear, the research and competence environments are there, and I expect the Minister to lift this further in the work on forthcoming energy reporting. The North Sea oil has given us tremendous values and contributed greatly to the development of our welfare society. That's the reason to be grateful. At the same time, we see that oil resources create major challenges. The combustion of oil and other fossil energy sources is destroying the climate on the planet by contributing strongly to global warming. Therefore, it is not desirable that everything be recorded and that everything should be used. The use of fossil energy accounts for around 70 per cent of greenhouse gas emissions globally, while at the same time increasing the demand and use of energy in the world in line with the population and improving living standards. Increased production of renewable energy will therefore be an im-

portant contribution to a better environment globally. More than $ 900 million must be invested annually to reach the two-degree target. Therefore, offshore wind power could provide a significant contribution to the renewable energy produced, also here in Norway. It is therefore important that investments do not stop now. It is a serious problem raised by the interpellant, as mentioned earlier, that the great optimism in the offshore wind environments has been turned into pessimism. Unfortunately, the situation is not unique to Norway. Several countries have already invested significantly in the development of marine energy, and in particular offshore wind turbines as fixed installations at relatively small depths. But the financial crisis has slowed the development of offshore wind turbines around the world. It is difficult to predict the future, but I have a hope that today's fossil energy production will eventually be replaced by renewables, also in the North Sea, and that today's oil installations in the North Sea in some years – perhaps many – can be replaced by wind turbines and other renewable energy technologies. Investment in offshore renewable energy will represent opportunities for Norwegian companies and expertise environments. The global offshore wind power market could grow rapidly. Norwegian companies can become part of this. We already have considerable expertise from offshore petroleum activities and onshore power generation, and we have a great deal of offshore wind, which together can provide unique opportunities in renewable offshore energy production. Norway currently has an important position as energy supplier to Europe. By further investing in energy production, we will further develop Norway's role as energy power.

Unemployment:

1. Marianne Marthinsen (Labor Party – 0.90 topic load):

Lower wage growth, lower oil investment, lower interest rates, increased unemployment – these are the prospects that most economists envision for the Norwegian economy. We recently saw an example of that in DN [Norwegian

newspaper] yesterday, where 25 macroeconomists responded to a survey conducted by the newspaper. After this government took office, the pace of the economy slowed, employment growth slowed, and unemployment increased. The government's response to it so far has been to make it more costly to lay off employees rather than go to layoffs. As a result, more people have lost their jobs and companies are losing valuable expertise. According to Norsk Industri, as many as 3,000 employees in their companies could be laid off instead of losing their jobs last year. Instead, the government has made it its main priority to cut taxes for the country's most prosperous, tax cuts that the government has not been able to reimburse contributes to anything but growth in differences. With the situation we see in Norwegian working life now, will the Prime Minister and the government, as the Labor Party has done in our alternative budgets, reverse the tightening that this government did in the layoff regulations?

2. Else-May Botten (Labor Party - 0.87 topic load):

   We are now seeing a dramatic situation related to the supplier industry. Hardest hit so far are the coastal counties Rogaland, Vest-Agder and the prime minister's home county, Hordaland. So far, around 7,000 employees have lost their jobs, and only 170 have been laid off. All this suggests that this will affect many more along the coast in the time ahead. The background to the situation is falling oil prices, fewer contracts, less maintenance, less oil service and fewer modifications on the Norwegian continental shelf. This strikes directly into the supplier industry and creates turmoil throughout the value chain. Politically, the situation requires an active business policy - a countercyclical policy, which in the short and long term can help to retain important competence, which in turn can contribute to value creation in the future. Does the government have a plan to address this situation with measures that can be targeted and good with a view to meeting this challenge?

3. Per Rune Henriksen (Labor Party - 0.84 topic load):

There is a lot of talk about change from the Minister of Trade, but as long as tax cuts are the most powerful tool that the government can offer, I would rather call it redistribution. When we have proposed specific measures for restructuring in both the supplier industry and the industry in general - as we did in the proposal to strengthen Enova and to identify and utilize the competence of the supplier industry in other industries - then we do not get the government or its support parties in the Storting with us on this . Norsk Industri yesterday said at the previously mentioned hearing that growth in the supplier industry was greatly underestimated. Now the downturn is underestimated. Is it really that we cannot expect any special measures from the government towards Norway's largest industrial industry, which will have assignments in the future, but which will for some years now be struggling?

External keywords. Seeing as the ToN corpus also has a list of keywords – unrelated to the topic model – attached to each speech, we can validate even further whether our topic model give us sensible topics. This is done by identifying whether speeches contain the keywords "Environment" for the "Green shift" topic, "Oil" for the "Renewable vs. oil sector" topic, and "Employment" for the "Unemployment" topic.

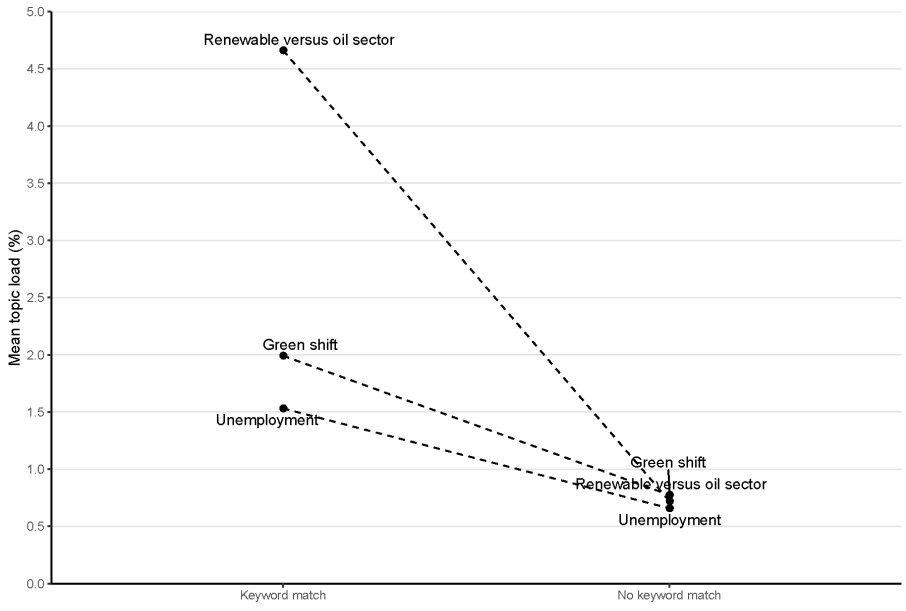


Figure A-3: Mean topic proportions for keyword matches and no keyword matches.

Figure A-3 shows the mean topic loadings over all speeches for these three topics we focus on in our analysis. The points on the left side of the plot show the mean for speeches which has a keyword match for each of the three topics, and the right side shows the mean for the speeches without a match.

As the proportions are double or more for the speeches that match on keyword compared to those that do not for the same topic, we are confident that our topic model has identified the underlying concepts we are interested in.

Other topics. Last, we investigate want to make sure the topic model is cohesive over other topic effects. In figure A-4, we plot the expected topic proportions for a topic about budget allocations. These are mainly discussed during the late fall and early winter in *Stortinget*. Thus, we split the effect between October through December and January through September. Clearly, MPs talk more about the budget topic when they are supposed to, with a difference of about 1.2%.

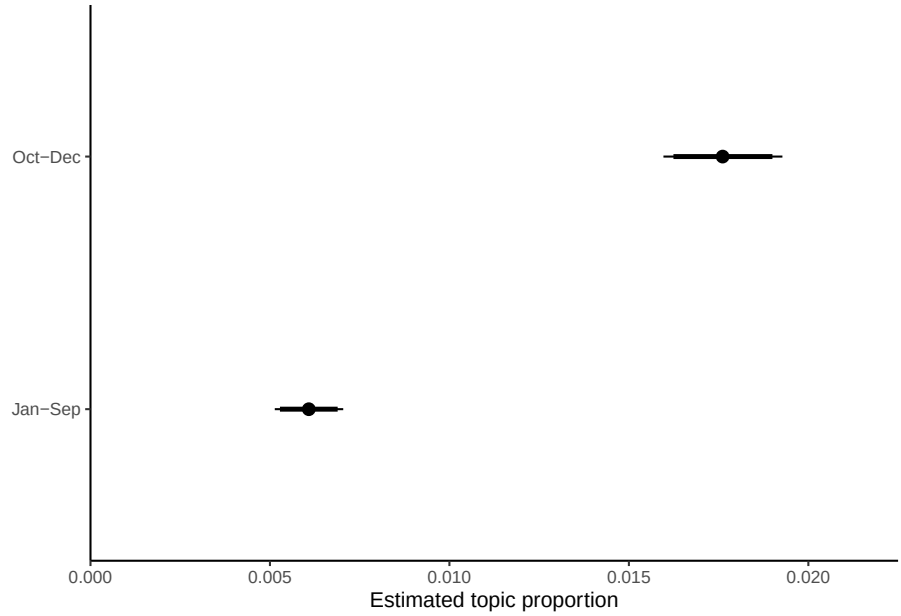


Figure A-4: Expected topic proportions for budget topic in late fall and the rest of the year.

Expected topic proportions before and after oil price shock

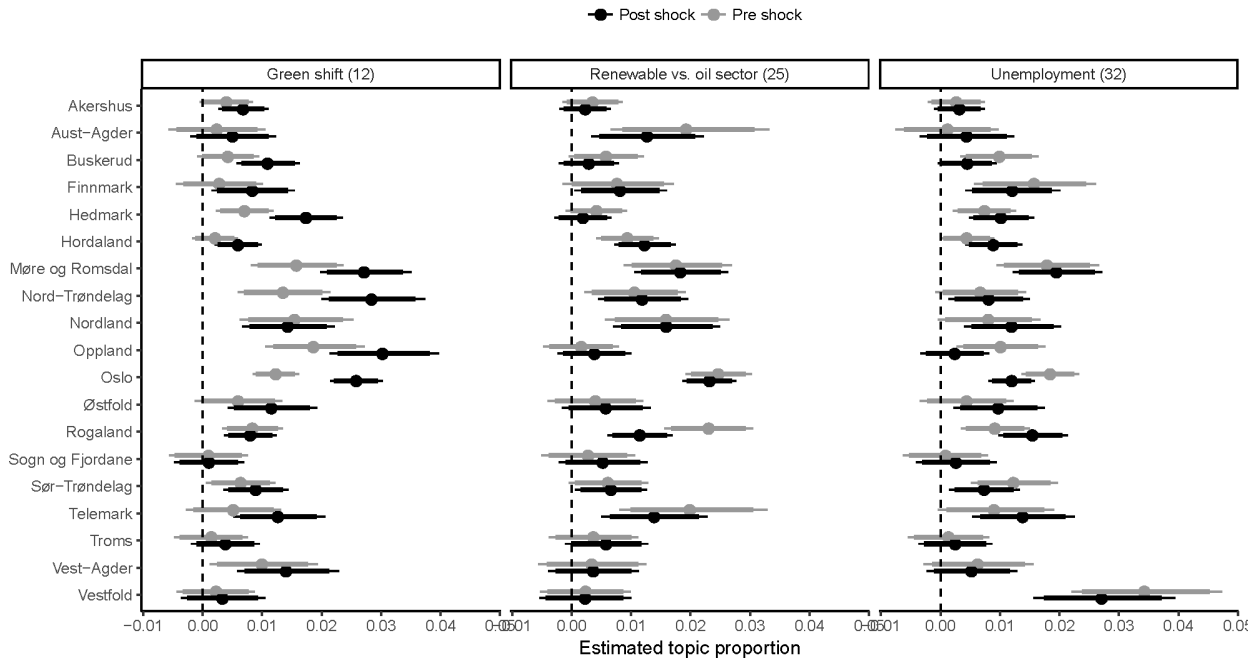


Figure A-5: Expected topic proportions before and after oil price shock over selected topics and all counties.

"Placebo"-analysis

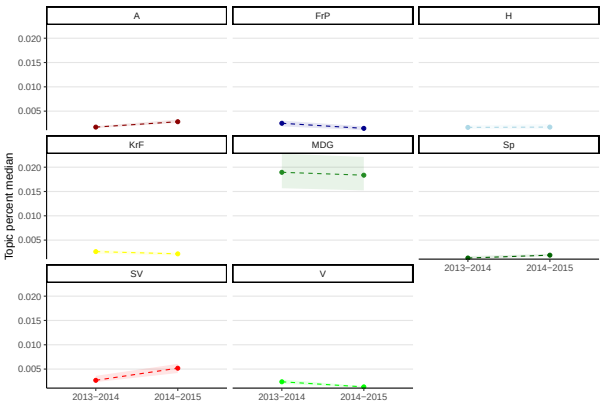
Table A-3: "Placebo"-analysis using data from the previous Storting.

	Rogaland	Other counties	Difference
	"Green shift"		
Before	.79	.45	.34
	(.25)	(.07)	(.26)
After	1.32	1.54	-.22
	(.32)	(.10)	(.34)
Difference	.53	1.09	**-.56**
	(.41)	(.12)	**(.43)**
	"Renewable versus oil sector"		
Before	1.68	.83	.85
	(.29)	(.08)	(.30)
After	1.32	.57	.74
	(.31)	(.07)	(.32)
Difference	-.36	-.26	**-.11**
	(.42)	(.11)	**(.44)**
	"Unemployment"		
Before	.57	.83	-.25
	(.19)	(.06)	(.20)
After	.47	.76	-.29
	(.22)	(.07)	(.23)
Difference	-.11	-.07	**-.03**
	(.29)	(.09)	**(.31)**

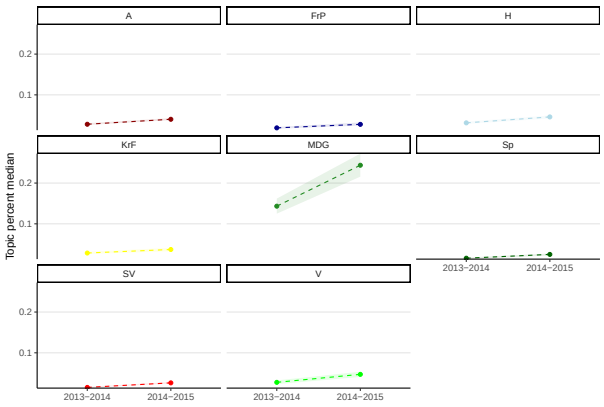
Note: Standard errors in parentheses.

Party effects

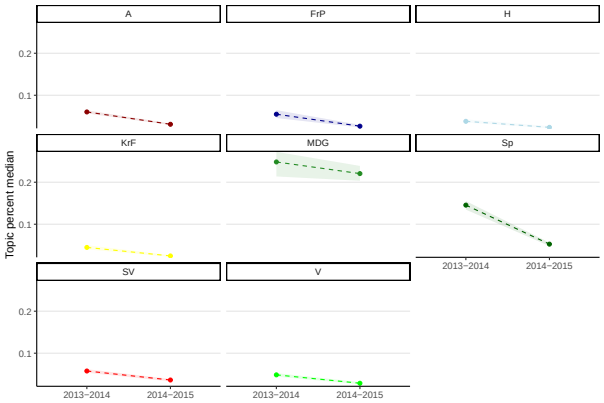
In order to make sure the results are not driven by partisan devides, we plot the mean topic proportions over our three main topics in figure A-6. The figure shows the topic attentions pre- and post-oil price bust for each party. We do not find large variation across parties, except that the Green Party increased their attention to renewable energy to a larger degree than the others, while the Center Party decreased their attention to unemployment to much larger extent than the other parties. Consequently, we argue that there is little reason to believe partisan effects are driving the results from our analyses.



(a) Green Shift (12)



(b) Renewable versus oil sector (25)



(c) Unemployment (32)

Figure A-6: Bootstrapped median topic percents for the three topics under investigation over parties. Lower and upper confidence bands show 0.05 and 0.95 quantiles from the bootstrap.

Results with committee fixed effects

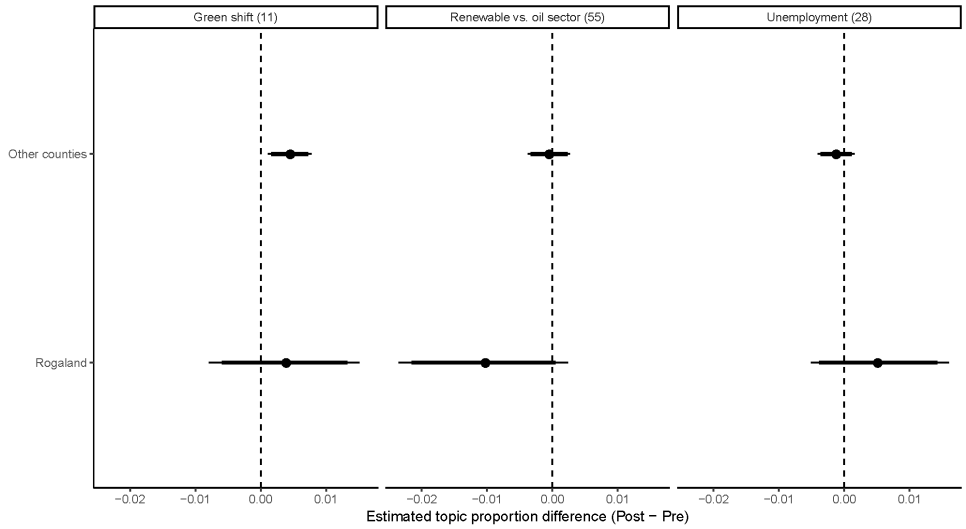


Figure A-7: Expected topic proportions before and after oil price shock over selected topics including committee fixed effects.

Results with other counties as treated in rotating fashion

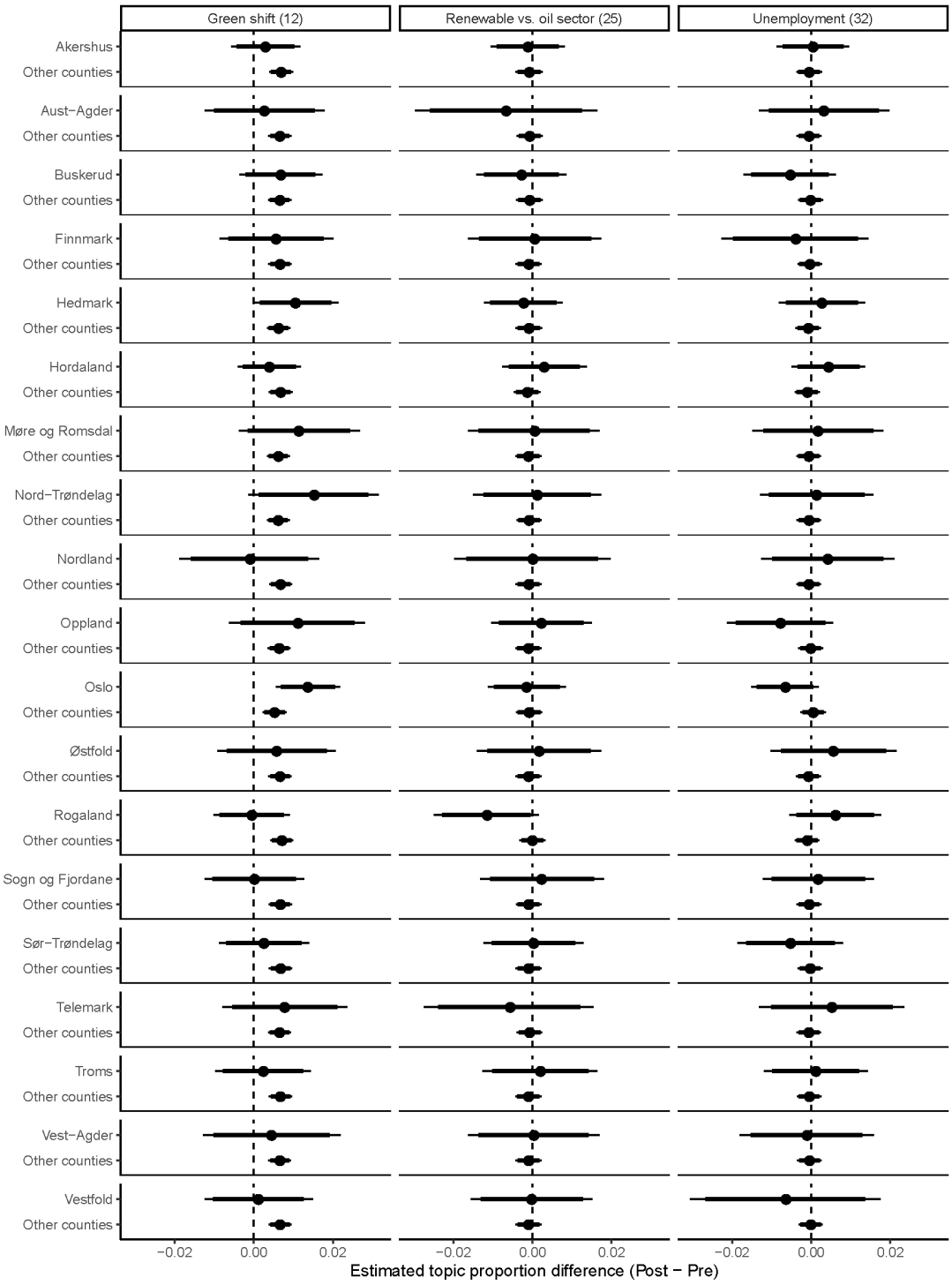


Figure A-8: Expected topic proportions over selected topics for all counties.

Results for unrelated topics

Figure A-9 shows the expected topic proportions pre- and post oil shock for Rogaland and all other counties collectively for five substantial topics we belive are unlikely to be related to the oil shock. As the figure shows, there are no substantial changes in focus for the the group of *other counties* or Rogaland in these topics, except for the Health Sector topic, which is somewhat higher for Rogaland in the post-treatment period. On further inspection, this seems to be a sole product of an MP from Rogaland (Olaug Bollestad (KrF)) on the Health committee becoming more active in this topic after the start of a new session (average topic load of 0.08 before and 0.13 after the oil shock).

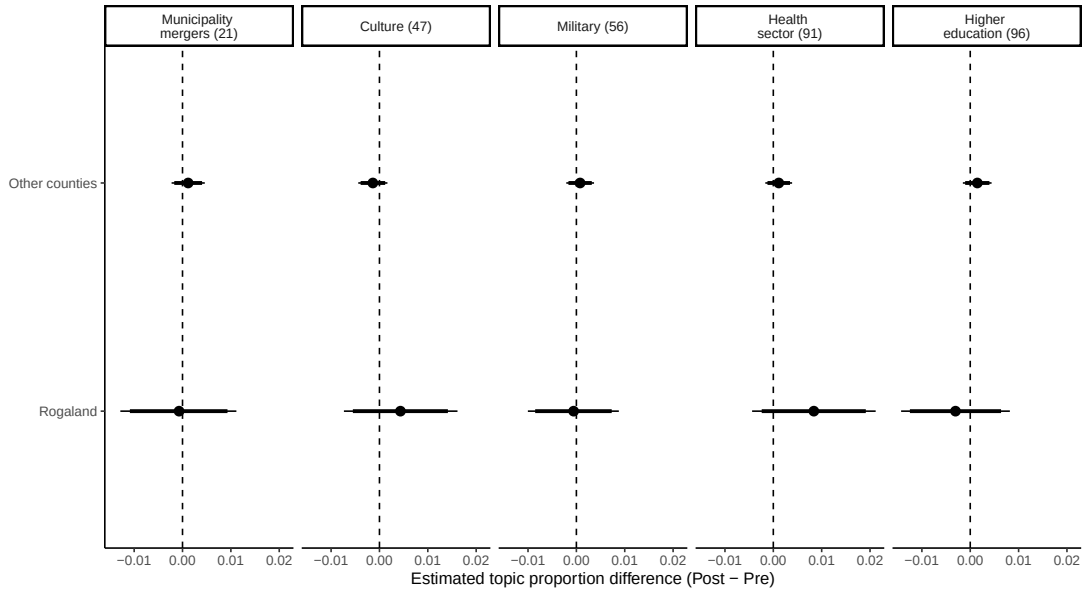


Figure A-9: Expected topic proportions over selected unrelated topics for Rogaland versus all other counties.

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