Electoral Systems and Legislative Preferences:

Pork Barrel Statements in Parliamentary Questions

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Overview

- **Motivation:**
  - How does the electoral reform change legislators' preference and their intentions to bring home the bacon?
- **Theoretical Expectation:**
  - Scholars have clearly explained why intraparty competition by different rules of electoral systems increases legislators' incentives to run on a personal reputation
  - We however know little about whether actual impacts introduced by the electoral reform through MMD (Multi-members District) to SMD (Single-member District) reduce legislators' motives to pursue pork barrel project in the legislature.
- **Data and Method:**
  - I finetune state-of-the-art transformer architectures fine-tuned with pork barrel-annotated legislation to evaluate pork-barrel activities in parliamentary questions.
  - Approximately 150,000 PQs between 1993-2019
- **Major Finding:**
  - Evidence exists to show that legislators under MMD are more likely to express political intention about pork-barrel projects in written parliamentary questions.
  - the reform demonstrates temporal dynamics: while initially reducing legislators' incentives for geographically targeted benefits, this constraining effect gradually diminishes and even reverses during election years.

Legislative Motions

Legislaive activities such as ***legislative votings***, ***debates*** (*e.g, ParSpeech V2*) and ***parliamentary questions*** (*e.g, LACAN*) play a significant role in most democracies.

> **Roll Calls**: Legislative votings are generally dominent by party
>
> - *Slapin et. al (2018): Politicians grandstand strategically against party in the British Parliament*
> - *Park (2021): in US House committee Hearings*
>
> **Debates**: MPs are not equally access to floor speech

The advantages of using the PQs:

> ***comprehensive***, ***accessible***, and ***rich***
>
> The party leadership have less control over MP's motivation to employ parliamentary questions *(Shane 2011)*.
>
> Parliamentary questions may reveal MPs' interests in policy preference (Shane 2011; Saalfeld 2011).

Legislative Motions

MPs ask questions for several reasons:

- Because of their **expertise** or domain responsibility of delegation for question topics.
- Personal preference such as their nature of **substantive representation** *(Russo 2021; Saalfeld 2011; Martin 2011)*
- Electoral motivation: **personal reputation** (Martin 2011)

Background & Literature

Theoretical Expectation:

> - Main Hypothesis: *Legislators elected under candidate-centered electoral systems (SNTV-MMD) are more likely to submit geographically targeted questions than those elected under party-centered systems (SMD).*

Table 1: The Electoral Reform in Taiwan's Legislative Yuan

	SNTV-MMD	SMD-MMM
Legislative Terms	4th – 6th	7th – 10th (present)
Period	1999 – 2007	2008 – 2019 (present)
Year	3	4
Total Seats	225	113
Seat Distribution	District (168); CLPR (41); Aboriginals (8)	District (73); CLPR (34); Aboriginals (6)

Methodology

Model-Finetuning:

- Used existing labeled pork-barrel legislation as training data
- Fine-tuned three major transformer models for Chinese classification tasks to identify
- pork-barrel features in parliamentary questions across time periods

Validation with Keyness Analysis:

- Conducted post-hoc evaluation using QTA techniques
- Validated results using development set

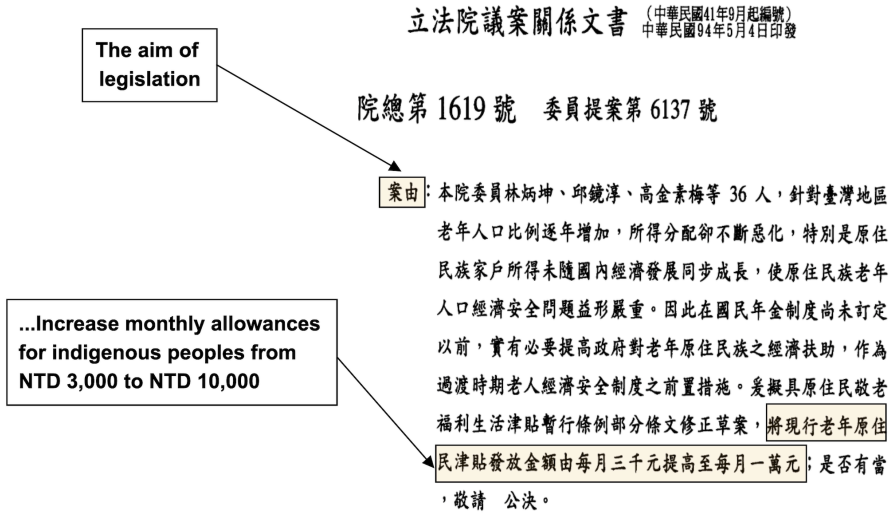
Regression Analysis:

- Performed regression analyses to test hypotheses
- Controlled for legislator and municipality fixed effects across years

Training Data

Pork Barrel Legislation Corpus:

- Typical pork-barrel policies (or legislation) mainly incur distributed costs while generating parochial benefits for ***specific regions*** or ***designated population groups***.



- This dataset was cross-coded by three social science researchers to perform its validity, which achieves 99% in terms of consistency and preciseness among coders (Luor and Hsieh 2008; Luor and Liao 2009).

Model-Tuning Strategies

Train, Test and Dev Set:

Table A.2: The Description of Train, Test and Development Set Split and Class Weight Adjustment

	Training Split			Class Weights		
	Train	**Test**	**Dev**	**Original**	**Weights**	**Normalized**
Pork	2,004	235	261	0.347	1.498	1.000
Non-Pork	3,768	487	461	0.652	0.750	0.501
Sub Total	5,772	722	722			
Total		7,216				

Training Data Source: Luor and Hsieh (2008); Luor and Liao (2009); Luor and Chan (2012)

Normalized Tensors:

$$\text{Original cross-entropy loss:} \quad L = -\sum_i y_i \log(p_i) \tag{A.1}$$

$$\text{Weighted cross-entropy loss:} \quad L = -\sum_i w_i y_i \log(p_i) \tag{A.2}$$

Model-Tuning Strategies

AnnealOnPlateau Technique

Table A.1: Learning Rate Scheduler with Restarts using AnnealOnPlateau Technique

Circle	Epoch	Learning Rate	Status
First Circle	1-15	5e-5 (0.00005)	Initial
	16-30	2.5e-5 (0.000025)	Decay
	31-45	1.25e-5 (0.0000125)	Decay
Second Circle	46-60	5e-5 (0.00005)	Restart to Initial
	61-75	2.5e-5 (0.000025)	Decay
	76-90	1.25e-5 (0.0000125)	Decay
Third Circle	91-105	5e-5 (0.00005)	Restart to Initial
	106-120	2.5e-5 (0.000025)	Decay
	121-135	1.25e-5(0.0000125)	Decay

Model-Tuning Strategies

Performance Metrics for All Transformer Models

Table A.3: Model Performance Comparison

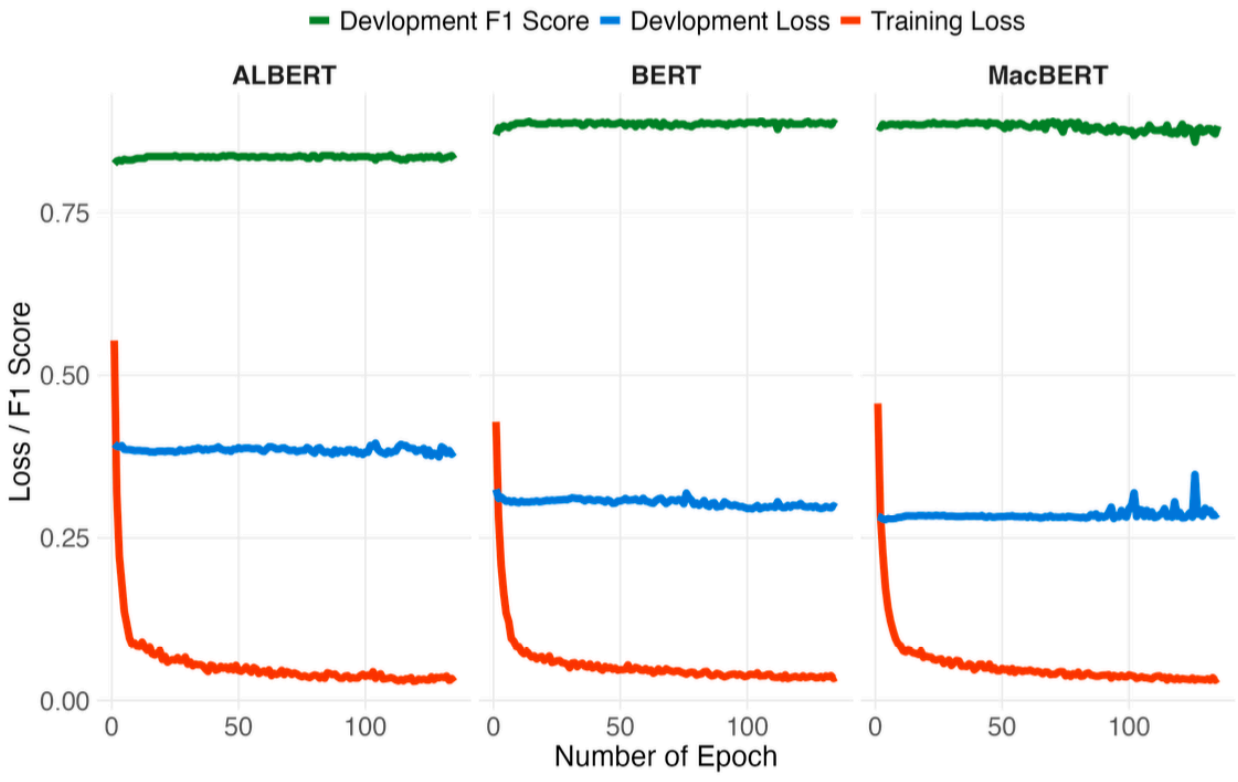
	ALBERT			BERT			MacBERT			
	P	**R**	**F1**	**P**	**R**	**F1**	**P**	**R**	**F1**	**Support**
Non-Pork	0.96	0.96	0.96	0.98	0.96	0.97	0.96	0.97	0.97	487
Pork	0.92	0.91	0.92	0.92	0.95	0.94	0.94	0.92	0.93	235
Accuracy	–	–	0.95	–	–	0.96	–	–	0.95	722
Macro Avg	0.94	0.94	0.94	0.95	0.96	0.95	0.95	0.94	0.95	722
Weighted Avg	0.95	0.95	0.95	0.96	0.96	0.96	0.95	0.95	0.95	722

Model	**Model ID**	**Source**	**Downloads**
ALBERT	ckiplab/albert-base-chinese	CKIP, Academia Sinica	256K
BERT	google-bert/bert-base-chinese	Google	11M
MacBERT	hfl/chinese-macbert-base	HFL, iFLYTEK	684K

Note: P = Precision, R = Recall, F1 = F1-score. Download counts from HuggingFace as of March 2024.

Monitoring Generalization Performance

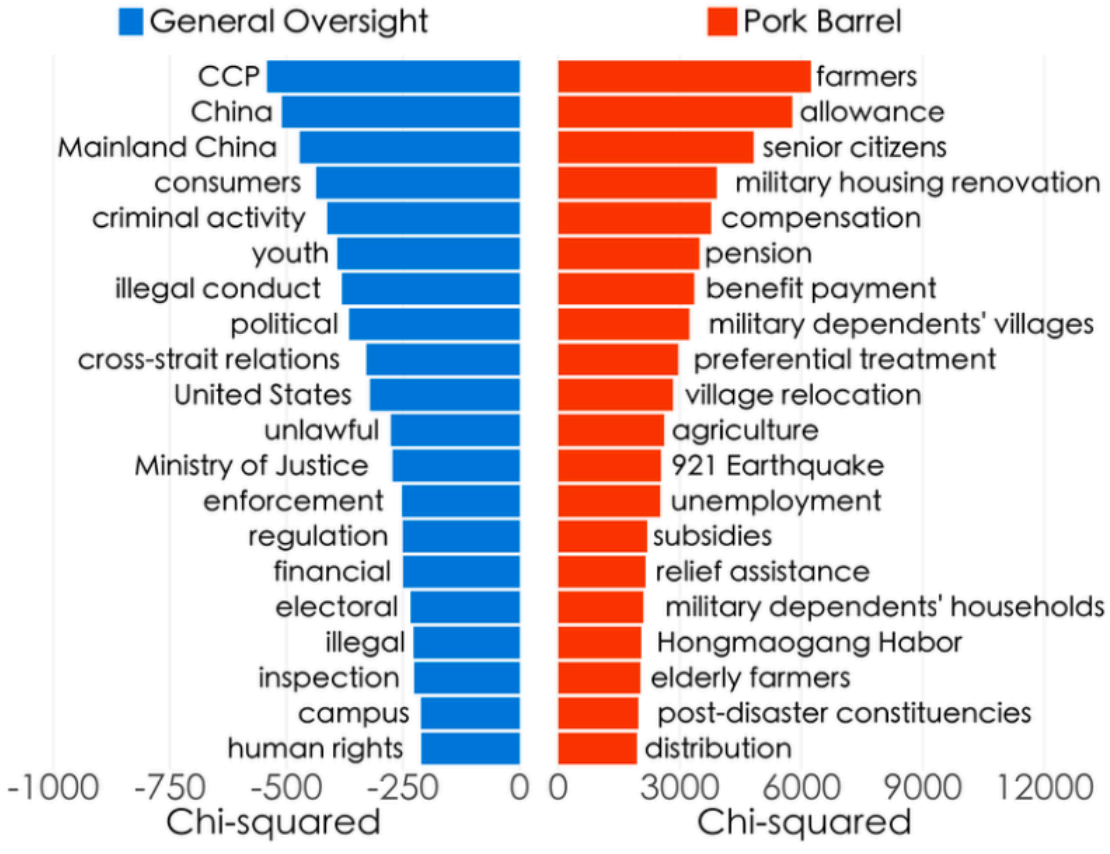
Figure A.1: Monitoring Generalization Performance: Evaluating BERT, Albert, and MacBERT Across 150 Training Epochs



Model-Tuning Strategies

Following recent application (i.e., Müller and Proksch, 2024; Sebok and Kacsuk, 2021).

Figure 3: A Keyness Analysis of Pork Barrel Questions vs. General Oversight



Regression Design

Construction of Pork Barrel Index:

$$\text{Pork Barrel Score}_{i,t} = \log(1 + \frac{\text{Pork Barrel Questions}it}{\text{Total Questions}_{it}}) \tag{0.1}$$

Regression Design:

$$\begin{aligned}\text{Pork Barrel Score}_{i,t} =& \alpha 0 + \alpha_1 Electoral\ Reform_t + \alpha_2 Year_t + \\ & \alpha_3(Electoral\ Reform_t \times Year_t) + \\ & Controls_{i,t} + \mu_i + \epsilon_{i,t}\end{aligned} \tag{0.2}$$

Results

Table 2: The Effect of Electoral Reform on Pork Barrel Politics

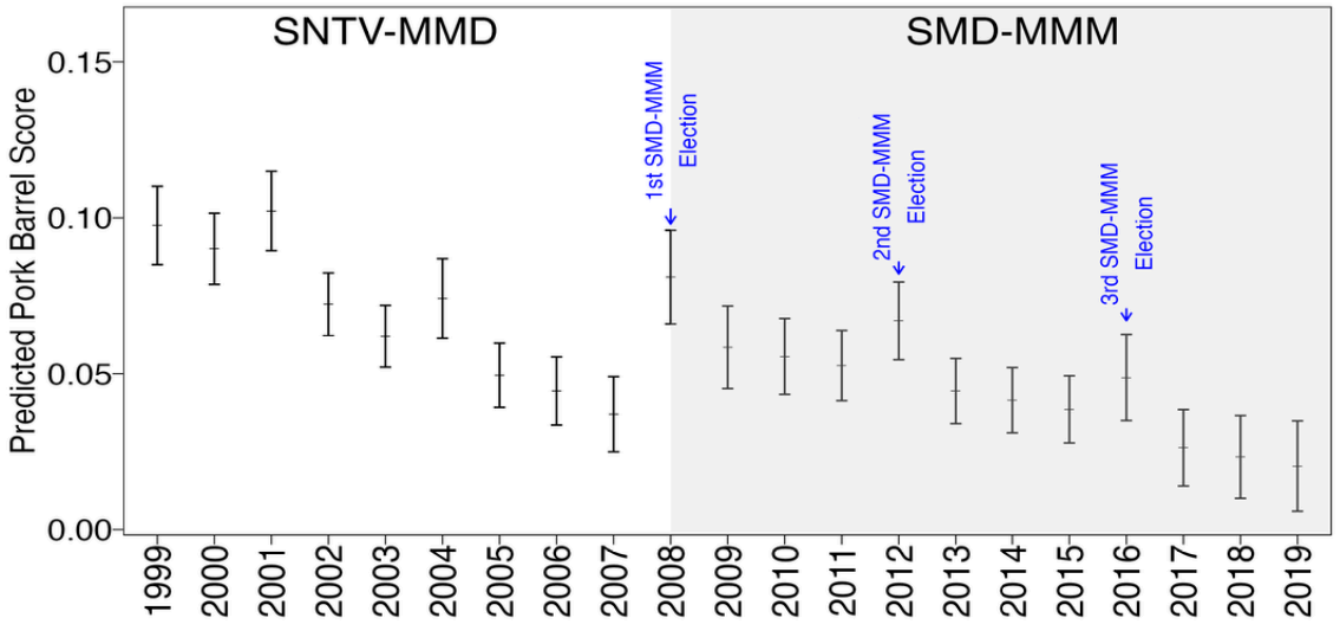
	Full Sample		District	
Model:	Model 1	Model 2	Model 3	Model 4
Post-reform (SMD-MMM)	-10.2***	-0.118***	-7.29**	-0.077***
	(2.09)	(0.021)	(2.78)	(0.016)
Year	-0.008***		-0.008***	
	(0.0008)		(0.0009)	
Post-reform (SMD-MMM) × Year	0.005***	0.000***	0.004**	
	(0.001)	(0.000)	(0.001)	
Party (Ref: Small Parties)				
DPP (Democratic Progressive Party)	0.004	0.000	0.004	0.004
	(0.005)	(0.006)	(0.007)	(0.008)
KMT (Kuomintang)	0.024***	0.024***	0.030***	0.026***
	(0.008)	(0.006)	(0.006)	(0.006)
Fixed-Year		✓		✓
Controls		✓		✓
Observations	4,070	2,809	2,506	2,506
R^2	0.0751	0.1049	0.0693	0.1132
Adjusted R^2	0.0678	0.0887	0.0580	0.0952

Note: *** p < 0.01, ** p < 0.05, * p < 0.1
Clustered district (first-level administrative divisions) standard-errors in parentheses

Results

Predicted Values of Pork Barrle Score with 95% Confidence Intervals.

Figure 4: Predicted Values of Pork Barrle Score with 95% Confidence Intervals.



Takeaway

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- Evidence exists to show that legislators under SNTV are more likely to ask pork-barrel projects in the questions.
- While initially reducing legislators' incentives for geographically targeted benefits, this constraining effect gradually diminishes and even reverses during election years.

The Limitation:

> **Training Data Limitation**: The training data for pork barrel legislation classification used in this paper covers a period of nearly ten years. However, the models might have limitations in capturing new concepts and patterns that emerged in the post-reform period.
>
> The steady decrease in the total number of parliamentary questions (PQs) since 2003 might be attributed to the rise of social media as an alternative channel for constituent communication. -> **Social Media?**

Thank You

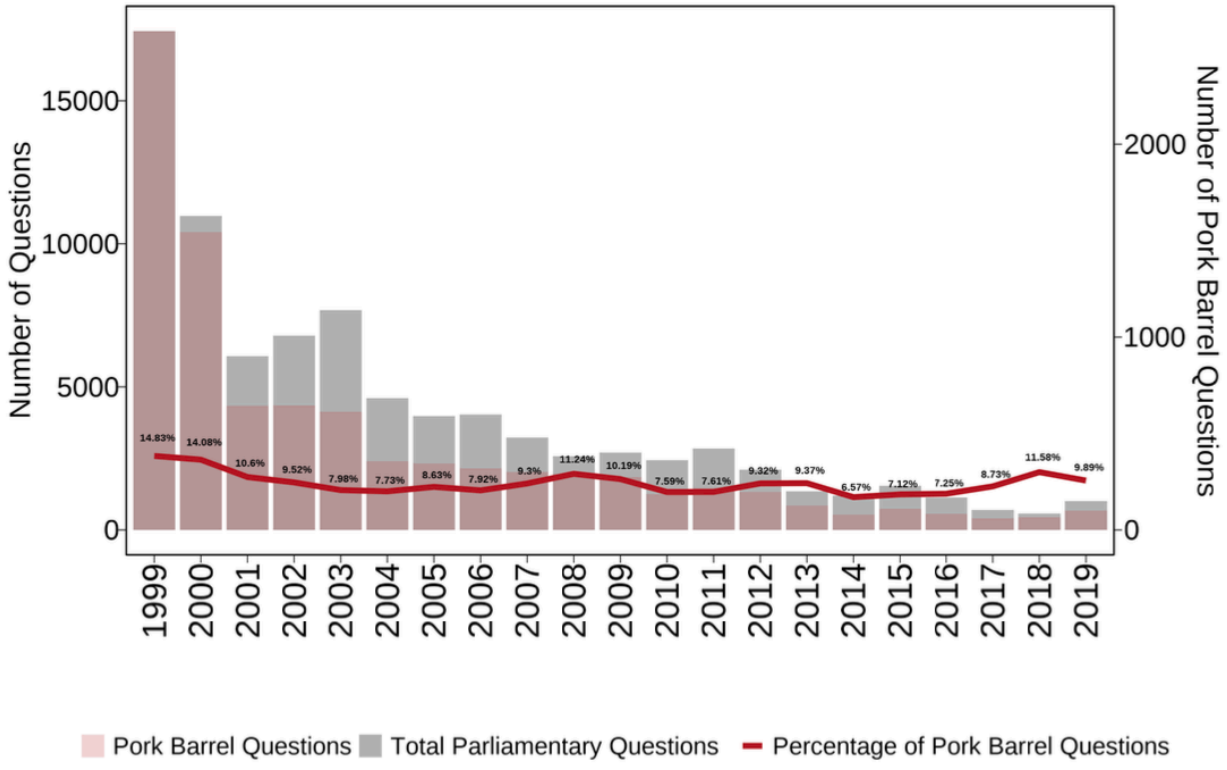
Table of the Appendix

Supplementary

The Number of Parliamentary (Pork) Question | The Performance of the Models

The Number of Pork Questions in CAP Domains

Figure 1: Frequency of Distributive Benefits Requests and Total Parliamentary Questions from 1999 to 2019.
Note: The line chart shows the annual average percentage of distributive benefits requests 4th to 10th Legislative Terms. The upper x-axis displays the number of distributive benefits requests, while the lower x-axis shows the total number of parliamentary questions.



The Number of Parliamentary Questions

Figure 2: Distribution of CAP Policy Domains in Pork Barrel Questions
Note: Each policy domain was classified based on 230 unique keywords following the Comparative Policy Agendas (CAP) framework.