

Electoral Reform and Pork Barrel

in Parliamentary Questions

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- Measuring legislator behaviours and tendencies towards constituencies under different electoral systems is important.
- This paper quantitatively investigates this topic using the case of Taiwan Legislative Yuan and data on written parliamentary questions through an electoral reform from *multi-member districts (MMD)* to *single-member districts (SMD)*.
- With existing labelled pork legislation, I train deep learning models using convolutional neural networks with an embedding layer extracted from Transformer BERT to detect pork-barrel features in parliamentary questions over time.
- Evidence exists to show that legislators under MMD are more likely to express political intention about pork-barrel projects in written parliamentary questions. The institutional change subsequently demonstrates heterogeneous effects on major parties vis-à-vis minority parties



- Legislative activities such as **legislative votings, debates** (e.g, **Parspeech V2**) and **parliamentary questions** play a significant role in most democracies.
- The advantages for focusing on parliamentary questions:
 1. The party leadership have less control over MP's motivation to employ parliamentary questions (Judge 1974, Shane 2011).
 2. Parliamentary questions may reveal MPs' interests in policy preference (Shane 2011).



- MPs ask questions for several reasons:
 1. Because of their **expertise** or domain responsibility of delegation for question topics.
 2. personal preference such as their nature of **substantive representation** (Russo 2021; Saalfeld 2011; Martin 2011)
 3. electoral motivation: **personal reputation** (Martin 2011)
 4. electoral rule and systems.



- In this paper, I introduce the case of **Taiwan Legislative Yuan**, where the electoral system reformed through SNTV to SMD, to evaluate how electoral motives shape legislators' tendency to pork-barrel projects under different electoral systems.
- In particular, parliamentary questions are the primary channel for legislators to **scrutinize the government** and **express political intentions**.
- These parliamentary questions allow identification of different **question topics, categories** and **further information** regarding **legislators' opinions of policy interests** and agenda at the individual level.

Parliamentary Questions



- In order to analyze parliamentary questions, I have webscraped the parliamentary questions from the official website of Taiwan Legislative Yuan from 1993 to 2020, including the relevant information about **the classified topics, selected keywords** and the corresponding **question type**.

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基本資料		問政成果							

詳細資料		第1/366筆		回查詢	下一筆	列印	存檔
質詢委員	丁守中	legislator					
質詢性質	預決算質詢						question type
質詢	立法院第7屆第7會期第12次會議 100年05月10日 100卷037期一冊3889號0341-0345頁						PDF
案由	行政院院長、主計長、財政部部長列席報告100年度中央政府總預算追加預算案編製經過，並備質詢。						the purpose
答復否	已答						
答復	立法院第7屆第7會期第12次會議 100年05月10日 100卷037期一冊3889號0341-0345頁 口頭答復						PDF
答復人	吳敦義	李述德	吳清基				
質詢日期	1000510	date					
答復日期	1000510						
系統號	205510						
類別	營建；賦稅；教育政務；水利						categories
主題	房價；課稅；水資源；教育人員俸給						types
關鍵詞	土地增值稅；財產交易所得稅；奢侈稅；大專院校教授薪資；節水；廢水回收再利用；抗旱						Keywords

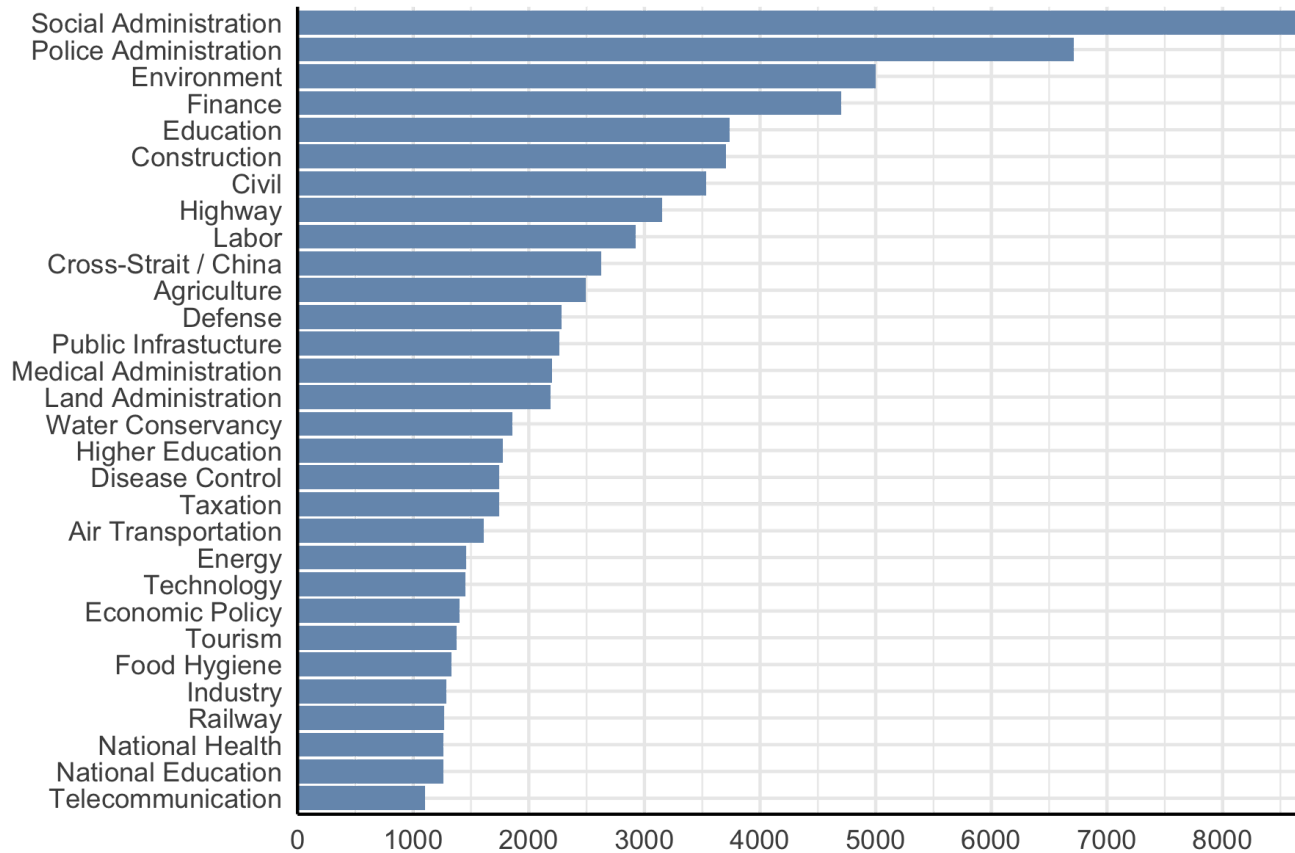


- The SNTV-MMD was the major system to elect legislators before 2008 in Taiwan.
- This was thought to intensify majority-seeking parties to run more than one candidate in a district, which increases incentives for candidates to run on personal votes against their party reputation (Cox 1990; Carey and Shugart 1995).
- The SNTV in Taiwan was criticized for creating **excessive intra-party chaos and competition** (Cox 1990; Hirano 2006; Ames 2001), as well as **encouraging factional and candidate-centered electoral politics** (e.g. Batto and Huang 2016; Wu 2003).



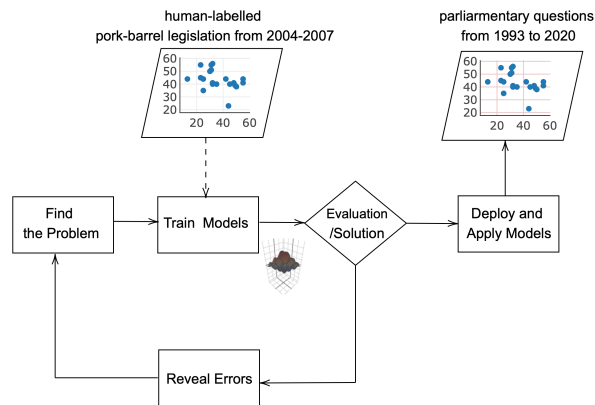
- Under SNTV, co-partisan candidates cannot rely exclusively on their party reputation and have to find an alternative means of attracting votes by **running on a personal reputation** via **providing particularistic services** (Cain, Ferejohn, and Fiorina 1987; Reed 1994; Carey and Shugart 1995).
- Catalinac (2016) finds that LDP (Liberal Democratic Party) candidates under the SMDs in Japan adopted new electoral strategies by mentioning programmatic policies such as national security.
- Hypothesis:
 - 1. Under SNTV-MMD, legislators are more likely to propose the questions regarding the provision of particularistic goods.**
 - 1. Under SMD-MMM, legislators are more like to ask the questions related to programmatic and regulatory policies**

Background & Literature



Training Deep Learning Model

- Existing labelled pork legislation
- Train a machine to identify pork-barrel features from parliamentary questions over time.



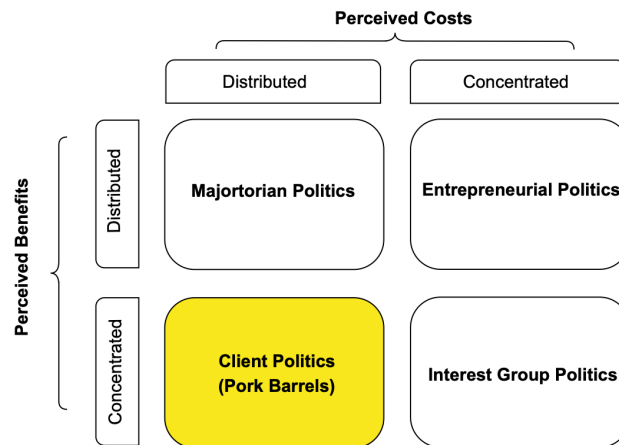
Regression

- Regression analyses are employed to answer the research questions.



Training Data: Pork-barrel Legislation

- The gold standard for identifying the pork-barrel legislation is based on the target beneficiaries of the policy (distributed vs concentrated) and attributes of policy cost (distributed vs concentrated).
- Typical pork-barrel policies (or legislation) mainly incur distributed costs while generating parochial benefits for **specific regions** or **designated population groups**.





An Example of Pork Barrel Legislation

立法院第 6 屆第 5 會期第 6 次會議議案關係文書

立法院議案關係文書 (中華民國 41 年 9 月起編號)
中華民國 96 年 3 月 28 日印發

院總第 1687 號 委員提案第 7375 號

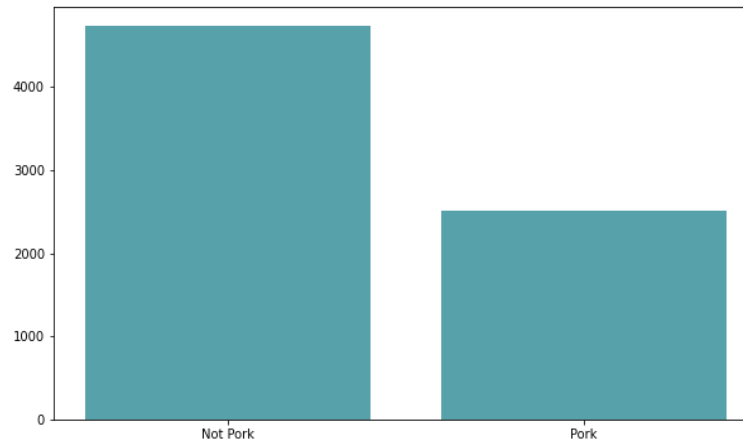
the purpose of statute

案由：本院委員林重謨、蔡啟芳、侯水盛、潘孟安、盧天麟、高建智、余政道、唐碧娥等 40 人，有鑒於最低基本工資可視為人民維持基本生活水準之意涵，現行每月僅有五千元之老年農民福利津貼^{increase farmer's allowance from NTD 5000}相較於一萬五千八百四十元之法定基本工資，實已偏低，不但無法維持老年農民基本生活需求，亦與老年農民長期對國家的貢獻不成正比，更有違政府落實照顧農民的承諾，再加上近年來物價年年高漲，使老年農民生活的艱苦更加雪上加霜。^{improving living standards}職是之故，基於保障老年農民基本生活水準^{in light of the contribution made by the farmers}，肯定老年農民之貢獻並提昇其生活品質，特擬具「老年農民福利津貼暫行條例第四條修正案」，比照國內法定基本工資之標準，將現行老年農民福利津貼發放金額由每月五千元提高至每月一萬五千元^{to NTD 15000}。是否有當，敬請公決。



Number of Train/ Test Splits

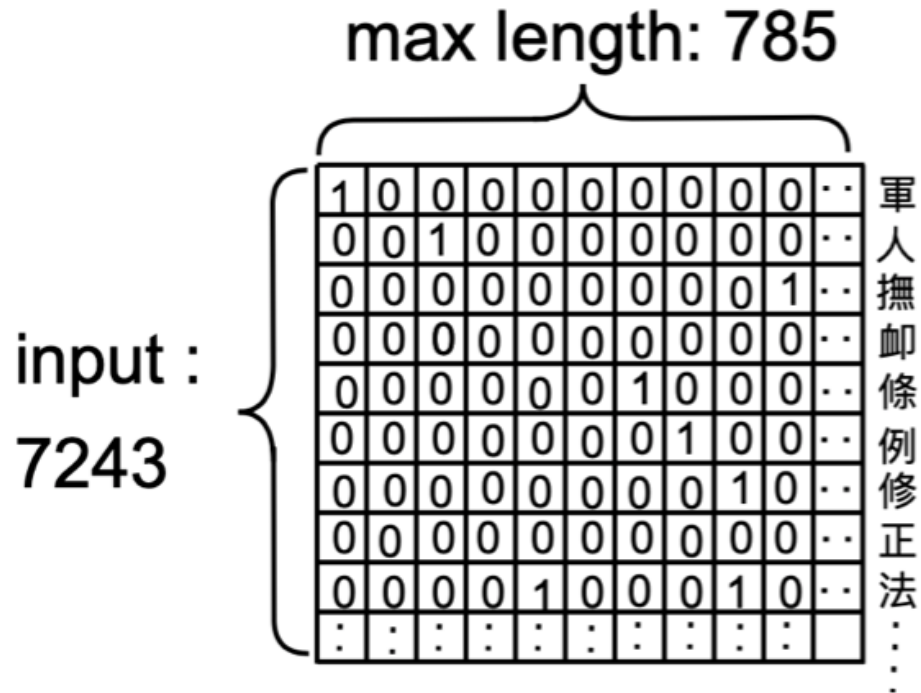
- The collection of this data set consists of 7243 pieces of legislation which were annotated as Pork (with label 1) or Non-Pork (with label 0).



- This dataset was cross-coded by three researchers to perform its validity, which achieves 98% in terms of consistency and preciseness among coders.

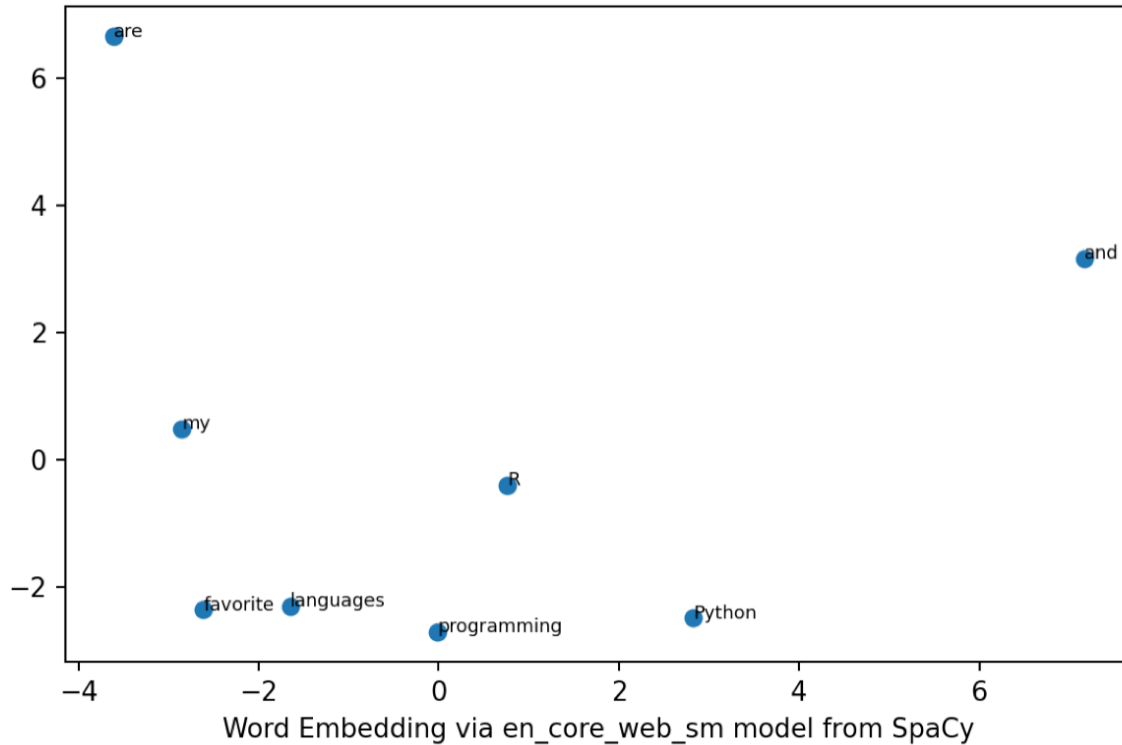


One-hot Encoding





Static Embedding Vectors





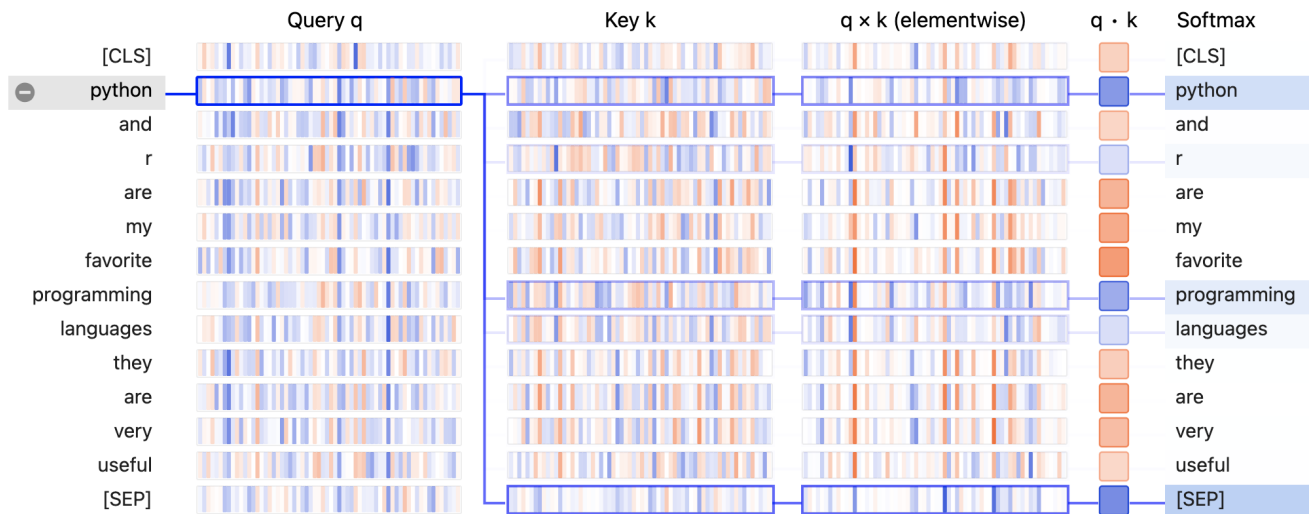
Static Embedding Vectors

```
nlp = spacy.load("en_core_web_sm")
vocab = nlp("R and Python are my favorite programming languages")
words = [word.text for word in vocab]
vecs = np.vstack([word.vector for word in vocab if word.has_vector])
pca = PCA(n_components=2)
vecs_transformed = pca.fit_transform(vecs)
```

```
plt.figure(figsize=(10, 7))
plt.scatter(vecs_transformed[:,0], vecs_transformed[:,1])
for word, coord in zip(words, vecs_transformed):
    x, y = coord
    plt.text(x, y, word, size=7)
plt.xlabel("Word Embedding via en_core_web_sm model from SpaCy")
plt.show()
```




Contexted-based BERT Embedding





Contexted-based BERT Embedding

```
from transformers import AutoTokenizer
from bertviz.transformers_neuron_view import BertModel
from bertviz.neuron_view import show
tokenizer = AutoTokenizer.from_pretrained("bert-base-uncased")
model = BertModel.from_pretrained("bert-base-uncased")
text = "R and Python are my favorite programming languages [SEP] Python is a snake"
show(model, "bert", tokenizer, text, display_mode="light", layer=0, head=8)
```



BERT Layers + Convolutional Neural Nets

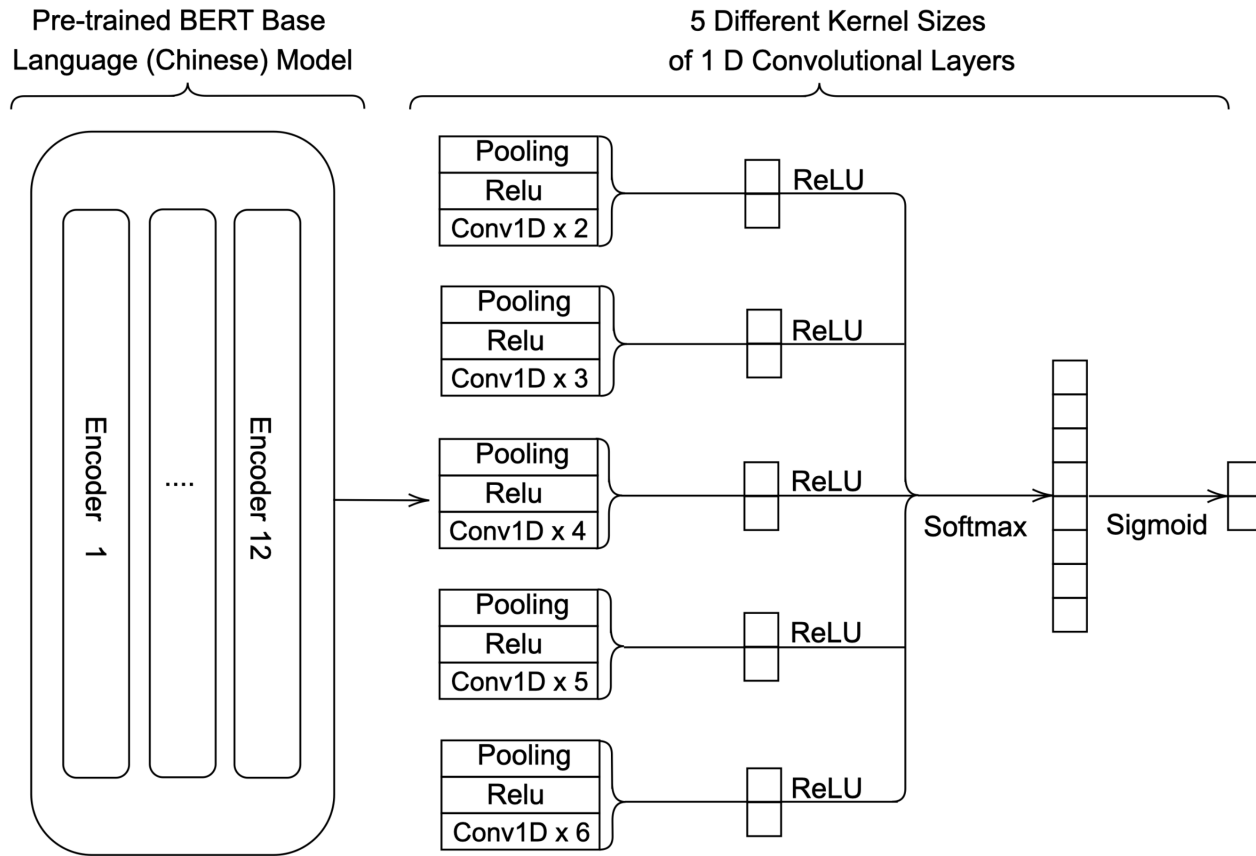


Table 5: The Performance of CNN, BERT and CNN-BERT

	TextCNN			BERT			CNN-BERT		
	Precision	Recall	F1-score	Precision	Recall	F1-score	Precision	Recall	F1-score
Non Pork	0.95	0.97	0.96	0.96	0.97	0.97	0.96	0.97	0.97
Pork	0.94	0.91	0.92	0.95	0.93	0.94	0.95	0.93	0.95
Accuracy			0.95	0.96		0.96			0.96
Macro Avg	0.95	0.94	0.94	0.96	0.95	0.95	0.95	0.94	0.94
Weighted avg.	0.95	0.95	0.95	0.96	0.96	0.96	0.95	0.95	0.95

Pork Featured Questions



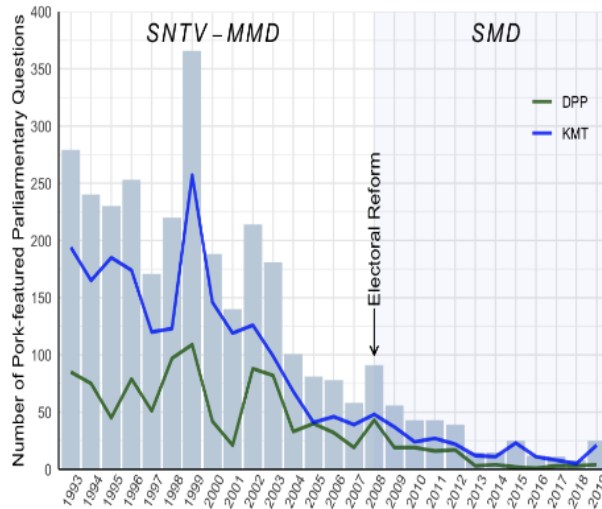
Legislator	Questions	Topics	Keywords
陳啟昱	鑑於現行《所得稅法》第十.	Income tax; education expenses; deductions	Special Deductions; Educational Expenditure
彭添富	針對「辦理九十四年原住民	Aboriginal life	housing subsidies
李復興	發現自九十三年一月間起	Old-age benefits; labor retirement	Retired employees allowance for the elderly
盧秀燕	針對早期退除役軍官給與補	Veterans welfare	Grants for early retired officers
丁守中	針就民眾陳情指出，目前政	Welfare for the handicapped	Living allowance
馮定國	鑒於國內經濟結構的快速	Elderly Welfare	Aging; middle and old age unemployment
彭添富	針對「豪雨成災，	Agricultural Subsidies	Heavy rain; crops
曾華德	為民國38年至43年間戍	Military Pay	Anti-Communist Salvation Army Reimbursement of Salary

Less-pork Featured Questions

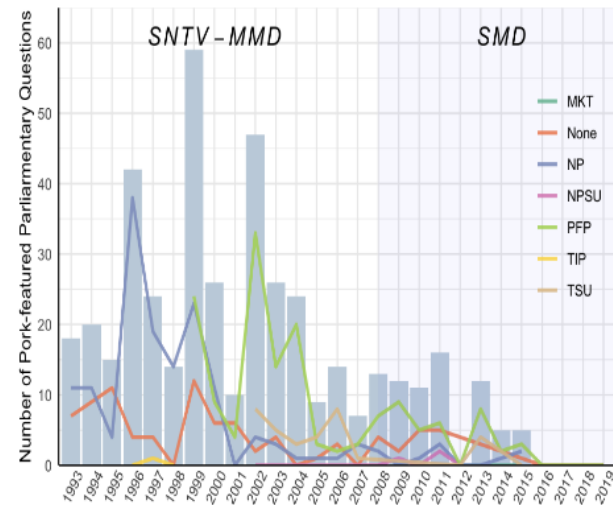


Legislator	Questions	Topics	Keywords
李復甸	鑑於刑事偵察實務上緩起	Investigation; litigation procedure	Criminal investigation; secret witness
林建榮	為立法院朝野協商修改銀	Financial management; bank management	Banking Law; Cash Card; Revolving Interest Rate
林正峰	針對行政院長張俊雄日前	Energy policy	Energy saving
林正峰	鑑於近年來臺灣地區毒品	Tobacco Restriction; Hospital	Drug Abuse; Departmental Hospital
王幸男	針對道路人孔蓋或管線挖	Public Safety	Manhole cover; public safety; road quality
管碧玲	針對近日台灣鐵路管理局	Railway management; ticket	Online booking; monopoly; Taiwan Railway
黃敏惠	就近日來爆發知名提神飲	Drinks; Poisoning	Drinks; Poisoning
陳朝龍	針對英國政府宣稱台灣出	Infectious disease prevention and control	British Government; Taiwanese birds; Avian Influenza

Tentative Findings



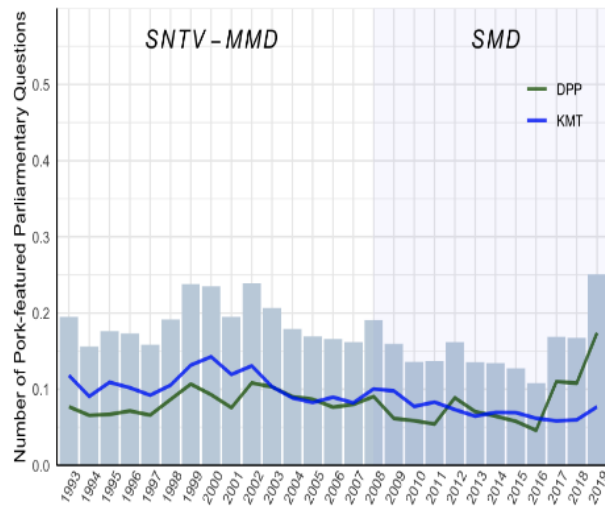
(a) Major Parties: KMT and DPP



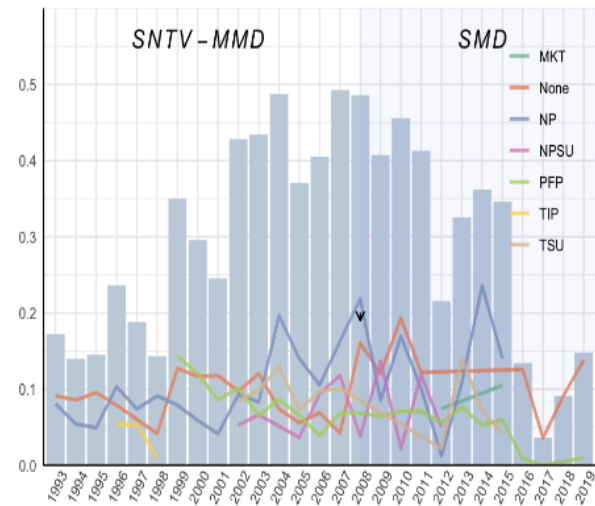
(b) Minority Parties: Others

Figure 5: The Number of Pork Barrel Question By Years

Tentative Findings



(a) Major Parties: KMT and DPP



(b) Minority Parties: Others

Figure 6: The Average Number of Pork Barrel Question By Years

Table 3: Regression Analysis for District-level Pork-barrel Parliamentary Questions by Quarter-yearly

	Full Model		Major Parties		Minority Parties	
	Integration	(+Controls)	Integration	(+Controls)	Integration	(+Controls)
Reform	-14.052*** (3.946)	-13.125*** (5.085)	-14.959*** (4.173)	-16.346*** (5.569)	-11.180 (8.365)	4.954 (19.928)
Year	-.006*** (0.001)	-.006*** (0.001)	-.006*** (0.001)	-.008*** (0.001)	-.002 (0.002)	-.001 (0.003)
Reform x Year	.006*** (0.001)	.006*** (0.002)	.007*** (0.002)	.008*** (0.002)	.005 (0.004)	-.002 (0.009)
Constant	12.610*** (2.129)	12.713*** (2.735)	13.732*** (2.408)	16.206*** (3.672)	5.091 (5.614)	2.712 (6.546)
District Fixed Effects		✓		✓		✓
Legislator Fixed Effects		✓		✓		✓
The Reform Year	✓	✓	✓	✓	✓	✓
Observations	4,252	4,252	3,539	3,539	713	713
Adjusted R^2	0.016	0.218	0.020	0.233	0.003	0.179

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses. The district-level pork-barrel parliamentary question at quarter-yearly is regressed on year, electoral reform, and interaction between year and electoral reform, with and without controls. Controls include fixed effects for electoral districts, municipalities, and individual legislators and the occurrence of the reform.



- Evidence exists to show that legislators under SNTV are more likely to ask pork-barrel projects in the questions.
- The reform demonstrates heterogeneous effects on major parties vis-à-vis the minority parties
- The Limitation:
 1. the pork barrel legislation from training data used in this paper has been nearly ten years. The deep learning classifier might fail to capture unknown concepts developed in the post-reform period.
 2. a steady decrease in the total number of questions since 2003
 3. Explainable Machine Learning: in Chinese or other Non-English languages might be somewhat challenging for social science students.



Thank You

Miscellaneous

- PorkCNN: A Small Project for Pork Barrel Legislation Classification Using Convolutional Neural Networks (<https://github.com/davidycliao/PorkCNN>)
- Tensorboard of PorkCNN (<https://tensorboard.dev/experiment/2Jm6GKexQiKaLyUz5uKSzg/#scalars>)
- legisCrawler: An Automation Webcrawling Toolkit for Retrieving Taiwan Parliamentary Questions (<https://github.com/davidycliao/legisCrawler>)