

Benefit or Loyalty:

An empirical research from the 2021 referendum in Taiwan

EDA and Visualization with Python

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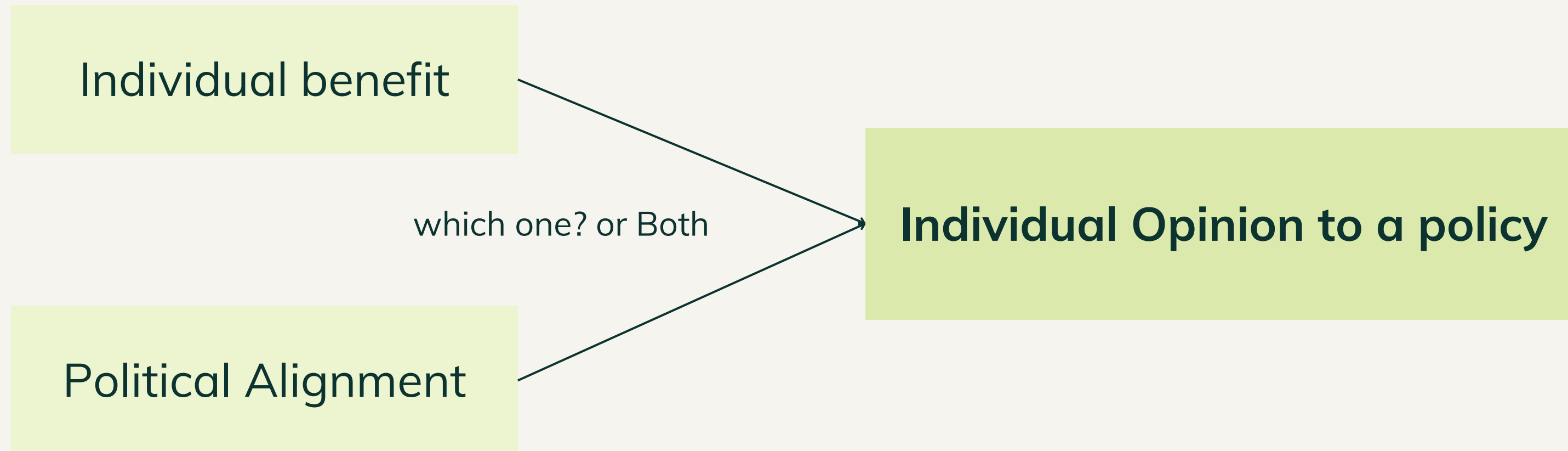


Agenda

- 1** Introduction & Background
What is this topic about & Why are we choosing this topic?
- 2** Hypotheses
What questions are we asking?
- 3** Data Sources & Variab
Where does our data come from?
- 4** Data Wrangling & Analysis
What did we do to clean the data & analyze it?
- 5** Conclusion
What did we find?



Research Question



Case Selection and Background

- Case study: the 2021 national referendum in Taiwan
 - No. 17: Restarting operation of the Fourth Nuclear Power Plant
 - **No. 18: Banning imports of pork containing ractopamine from the U.S.**
 - No. 19: Making elections and referendums concurrent
 - No. 20: Relocating the gas receiving terminal at Guantang of Taoyuan City
- Analytical level: township (n = 368)
- Why No. 18?
 - High salient issue
 - Clear stakeholders: Pork industry in Taiwan
 - Quantifiability: The number of Pig farms

4 Issues

No. 17

Restarting operation of the
Fourth Nuclear Power Plant

- Nuclear Safety (Earthquake) / Energy Stability
- Old issue since 2000
- It is a partisan issue

No. 18

Banning imports of pork containing
ractopamine from the U.S.

- Food safety / Trade policy / International relation
- Ractopamine: used as a feed additive to develop leanness and increase feed conversion efficiency in different farm animals
- Proposed by a opposition legislature

No. 19

Making elections and referendums
concurrent

- Electoral participation
- The current law, which was legislated by the ruling party, do not allow elections and referendums being hold on the same day
- Proposed by a opposition legislature

No. 20

Relocating the gas receiving terminal
at Guantang of Taoyuan City

- Environmental protection / energy stability
- Provide the gas usage of power stations
- The construction could destroy the coral eco-system

Ruling Party: Four Disagree!

Main Opposition Party: Four Agree!

Hypotheses

The voters' decision could be influenced by two factors: self benefit, and political alignment.

Thus, we hypothesize that:

1. The number of pig farms in a town will increase the agree rate of the pork import ban, but not other referendums
 - The import of pork has negative impact to their economic benefits
2. The number of cow farms in a town will not affect the agree rate of pork import ban and other referendums
 - These issues do not related to the economic benefits of cow industry
 - Beef as substitute of pork, will cow industry be affected by the import of pork?
3. The higher the support rates of the ruling party (Demo Progressive) in a town, the lower agree rates in four referendums
 - To align with the position of ruling party
4. The higher the support rates of the main opposition party (Nationalist) in a town, the higher agree rates in four referendums

Hypotheses

Dependent Variable	Independent Variable	Expected Effect
Ban Pork import Agree Rate	Number of pig farms	+
Ban Pork import Agree Rate	Number of cow farms	Null (-)
No.17, 19, 20 Agree Rate	Number of pig farms	Null
No. 17, 19, 20 Agree Rate	Number of cow farms	Null
All Referendums Agree Rate	Ruling party's vote share in 2020	-
All Referendums Agree Rate	The main opposition party's vote share in 2020	+

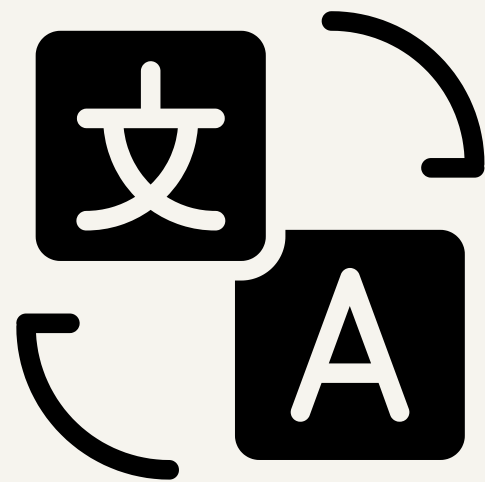
Data Sources

Data Source	Description
Central Election Commission, Taiwan	The 2021 referendum result (DV)
Taiwan Agricultural Knowledge Portal	Number of pig / cow farms in each town in 2021 (IV)
Central Election Commission, Taiwan	The 2020 presidential election result (IV)
Government Open Data Platform	The distribution of income, gender, age for each town in 2021 (IV)
Department of Household Registration	Population and Population Density of each town in 2021 (IV)
Socioeconomic Data Service Platform	Education levels of each town in 2021 (IV)
Government Open Data Platform	Boundaries of Towns in Taiwan

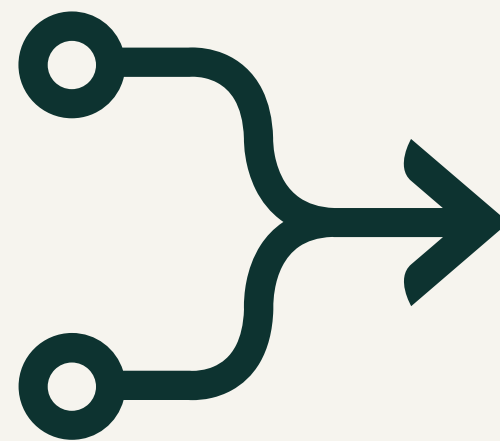
Variable Operationalization

Variable	Operationalization
No. 17, 18, 19, 20 agree rate	The agree vote share of the 4 referendums in 2021
Number of pig farms	The number of pig farms in a county
Number of cow farms	The number of cow farms in a county
Support rate of ruling and opposition	The vote share of DPP (ruling) and KMT (main opposition) in 2020 presidential ellection
Female rate	Female population / total population in a county
Income	Average income in a county
Population density	Total population / county area
Post secondary rate	The percentage of population with college degree or above
Percentage of the elderly population	The percentage of population aged above 65

Data Wrangling



- Translate for county and township
- Retrieve, clean, and map data
 - 2021 referendum results on 4 issues
 - 2020 presidential election results



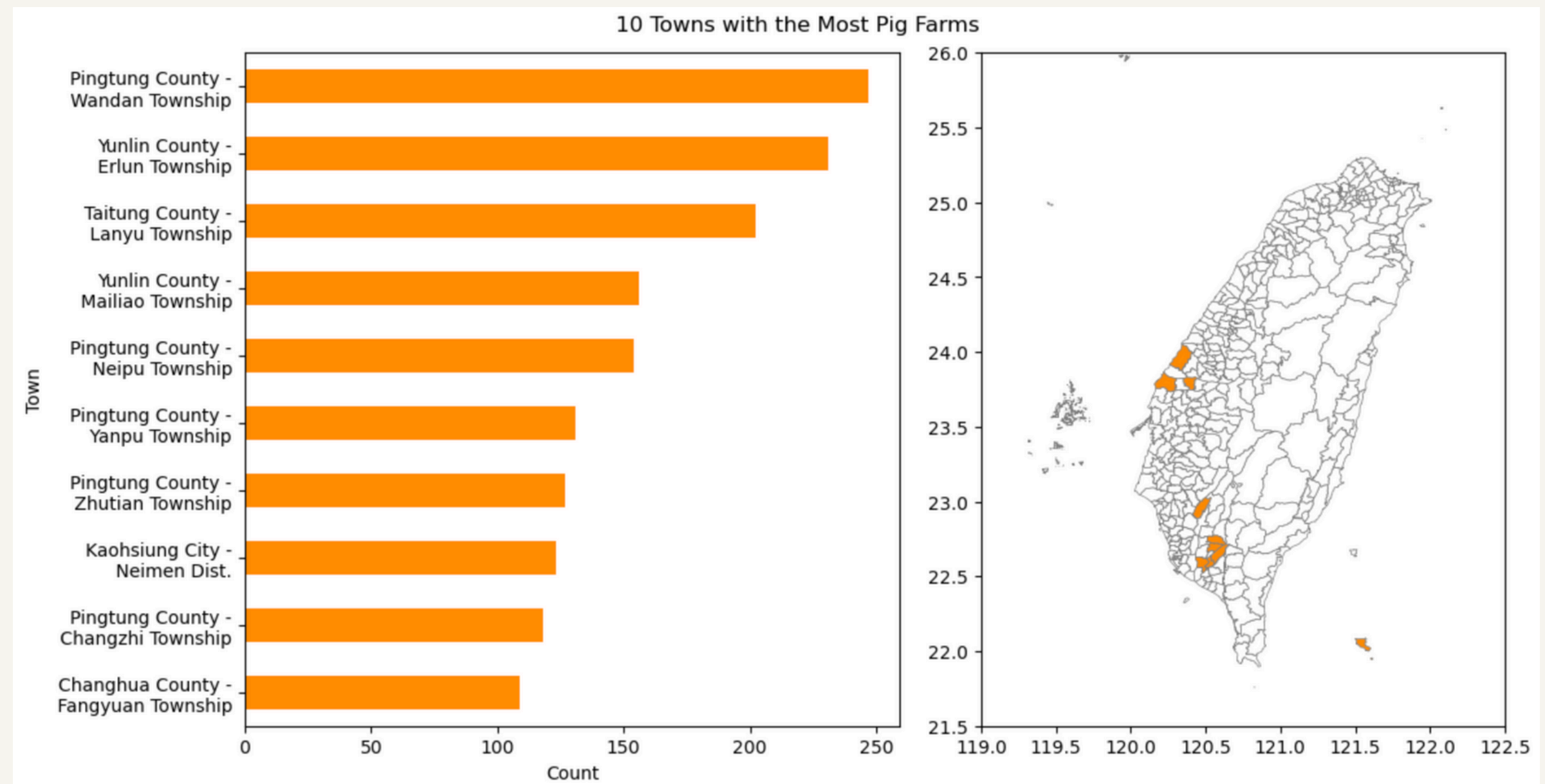
- Clean and merge dataset
 - Number of Livestock Farms
 - Income, education level
 - Age, gender, population



- Geometry Data
 - geographic information

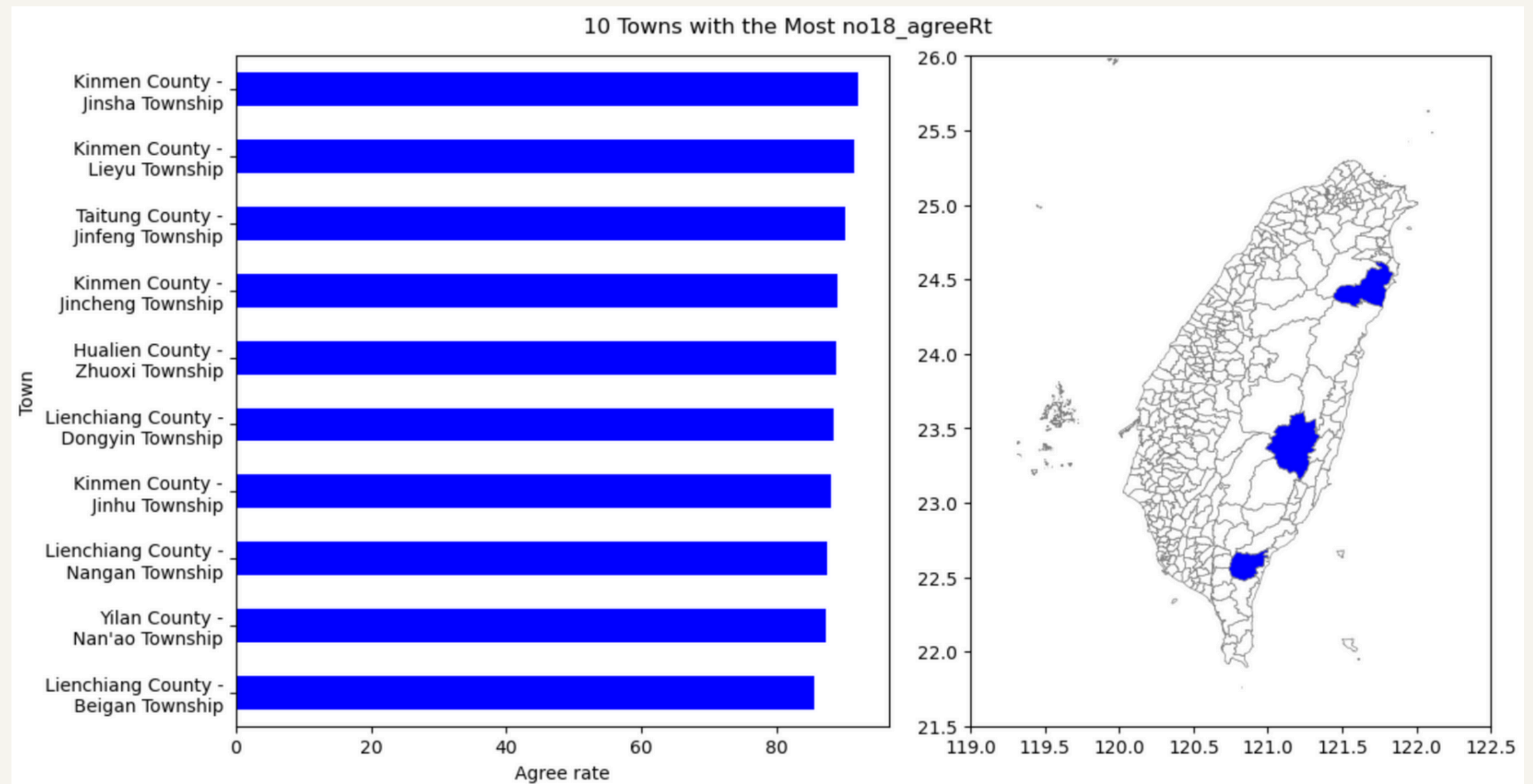
Data Analysis - EDA on Demographic Variables and Agree Rate on Issue No.18

- Top 10 Towns with the Most Pig Farms
- Located in the central and southern part of Taiwan



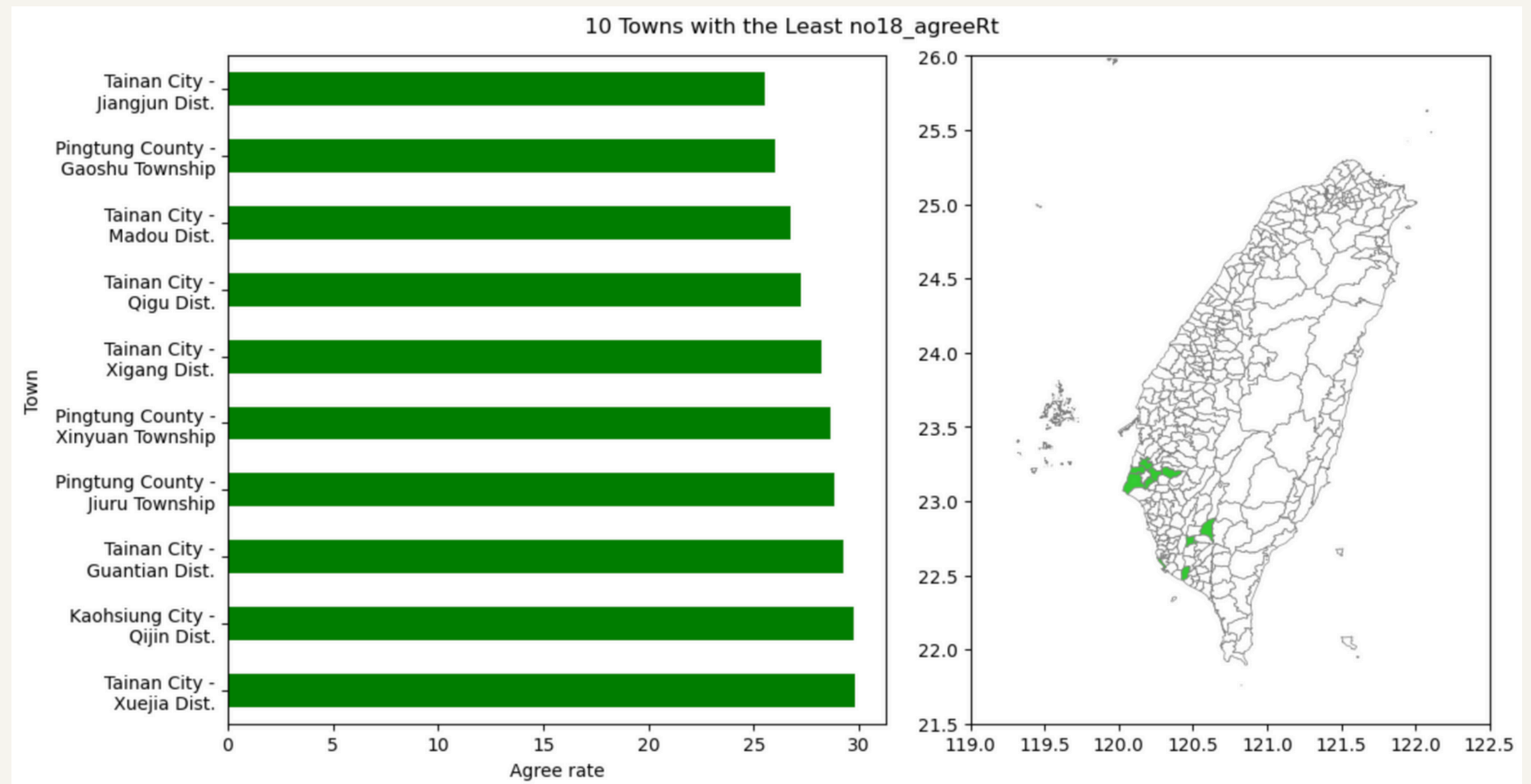
Data Analysis - EDA on Demographic Variables and Agree Rate on Issue No.18

- 10 Towns with the Highest no.18_agreeRt
- Are traditionally known as strongholds of the main opposition party, KMT



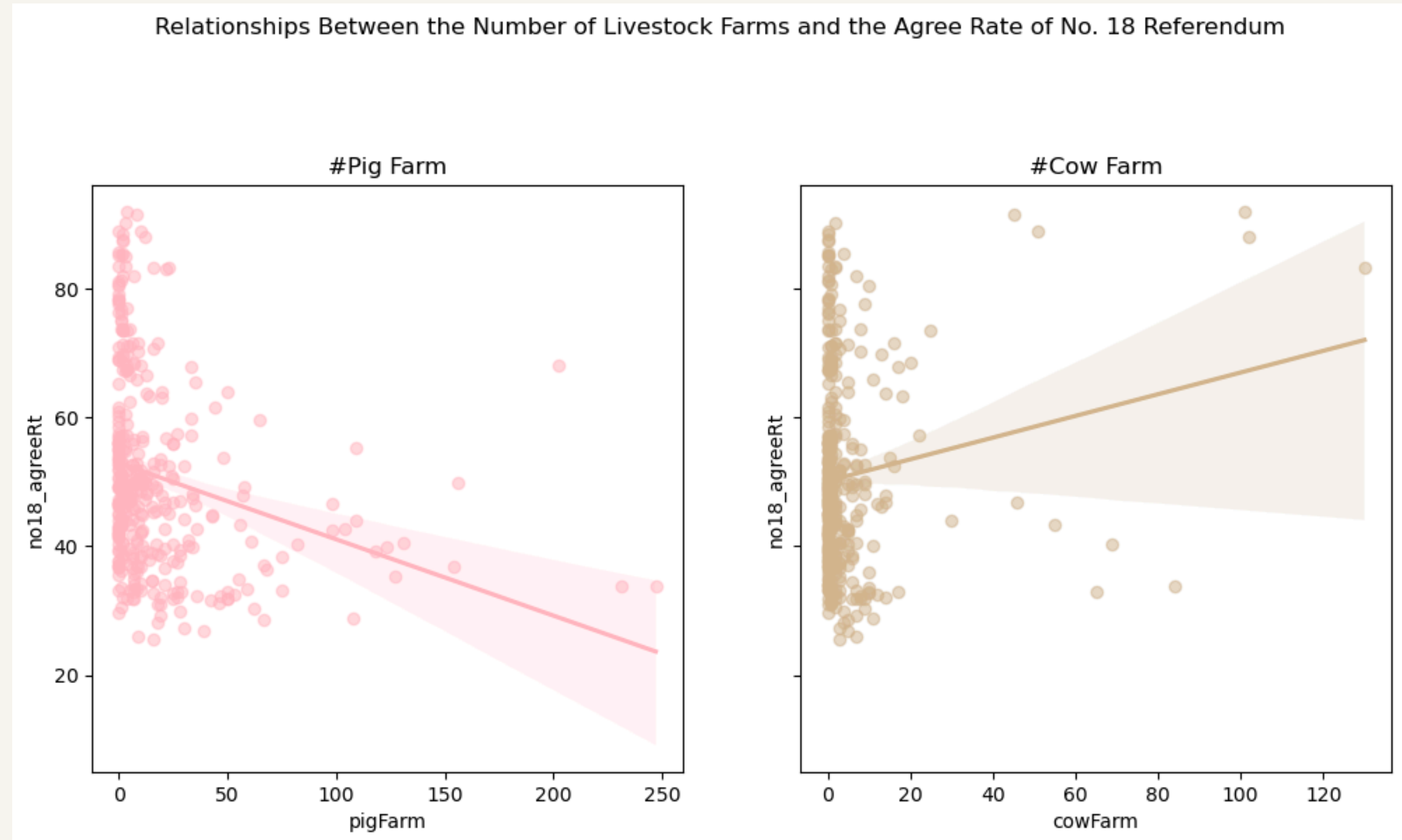
Data Analysis - EDA on Demographic Variables and Agree Rate on Issue No.18

- 10 Towns with the Lowest no.18_agreeRt
- Concentrated in the Tainan city and Pingtung county



Industry and agree rate

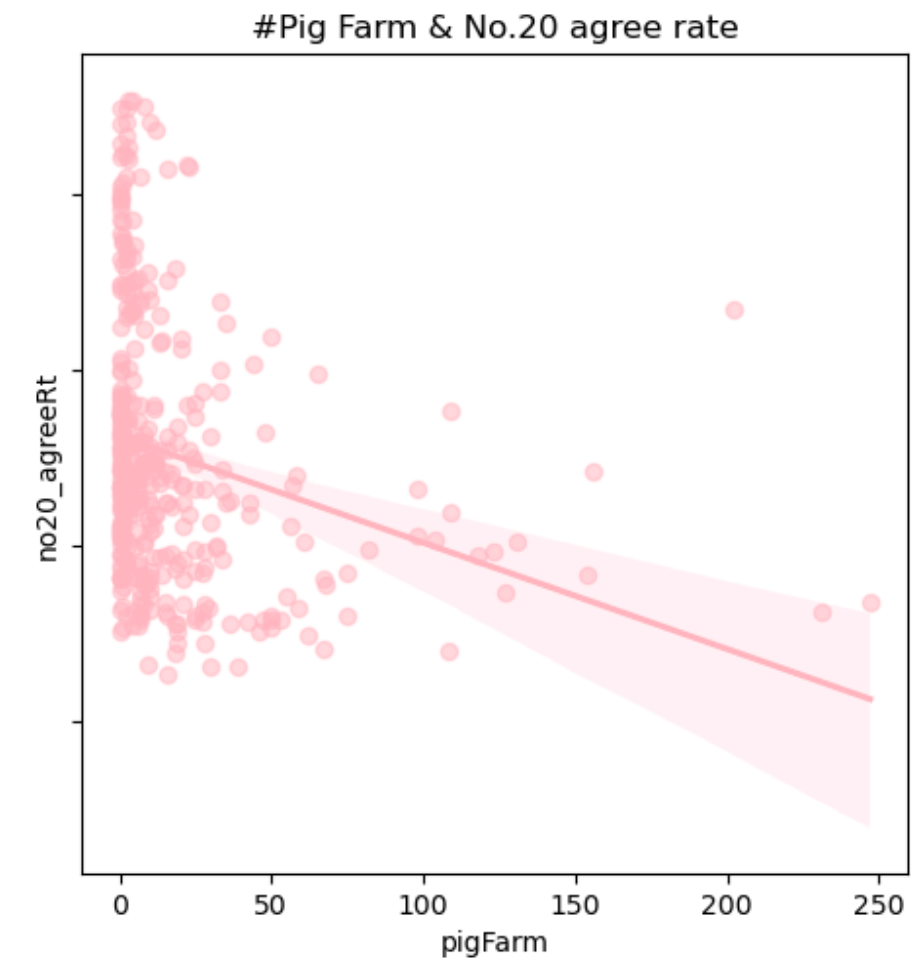
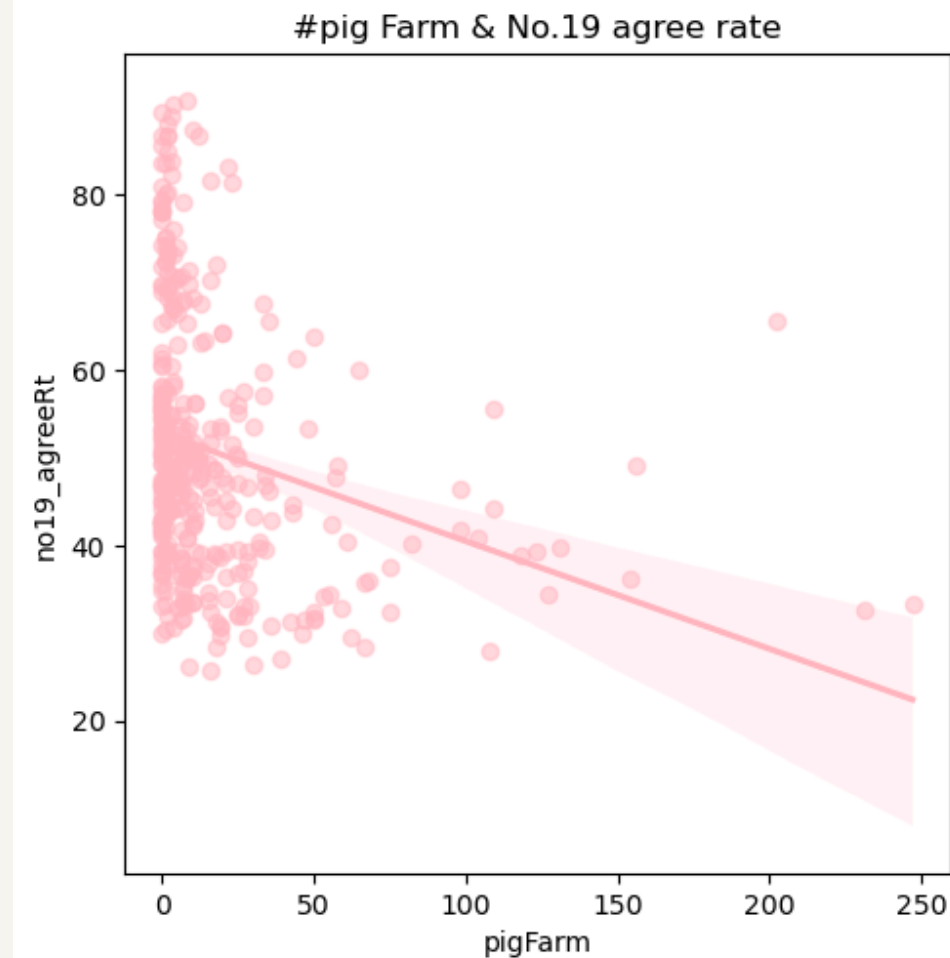
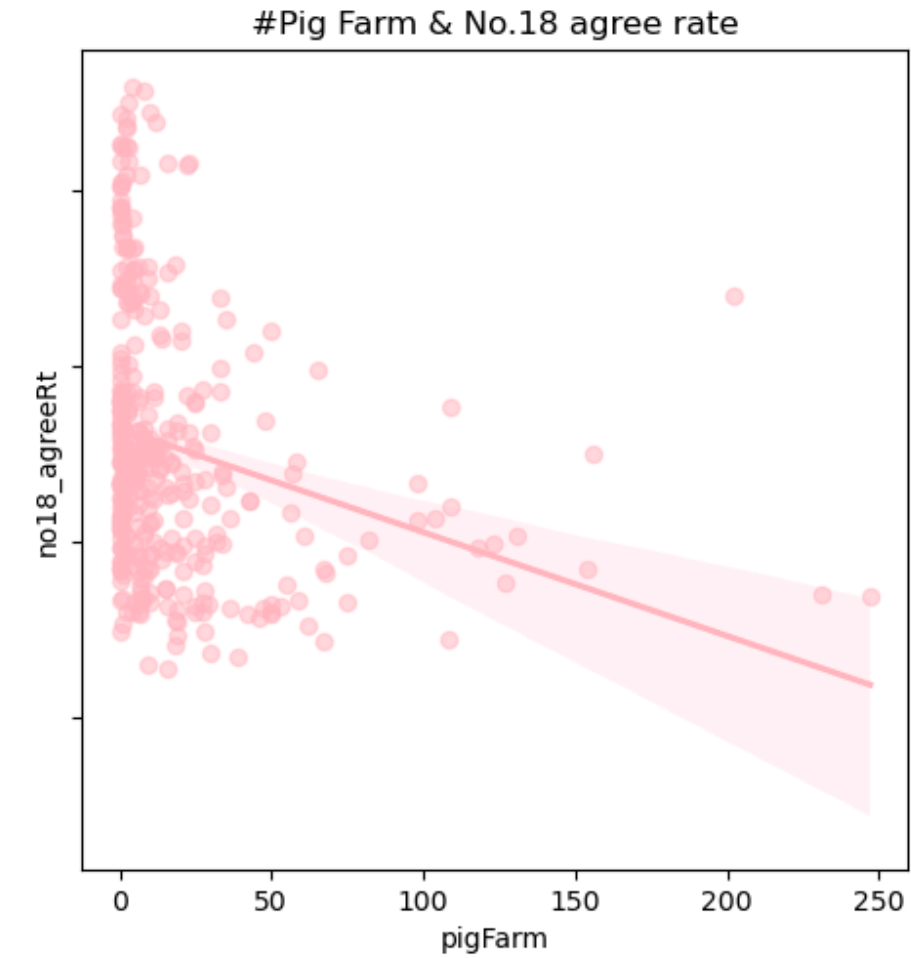
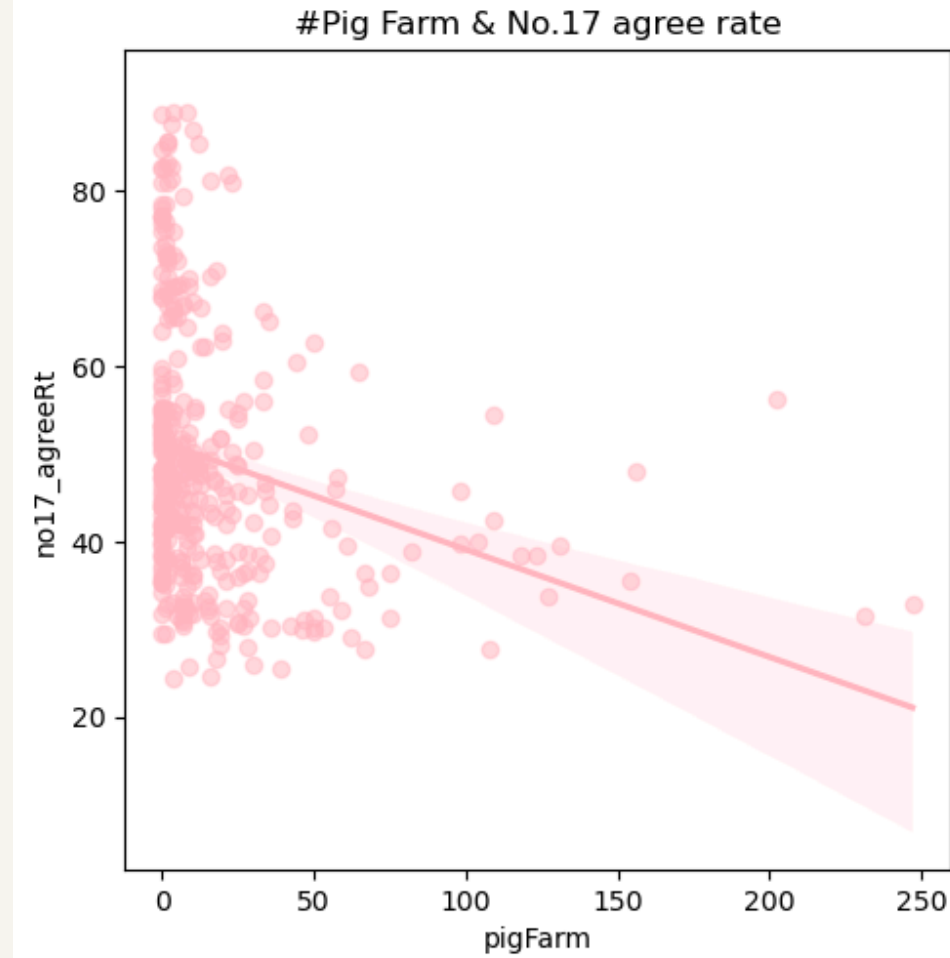
- Number of Pig Farm v.s No.18 Agree Rate (Negative correlation)
- Number of Pig Farm v.s No.18 Agree Rate (Positive correlation)
- The results are the opposite of our hypotheses



Industry and agree rate

- The influence of the number of pig farms has similar pattern in all 4 referendums

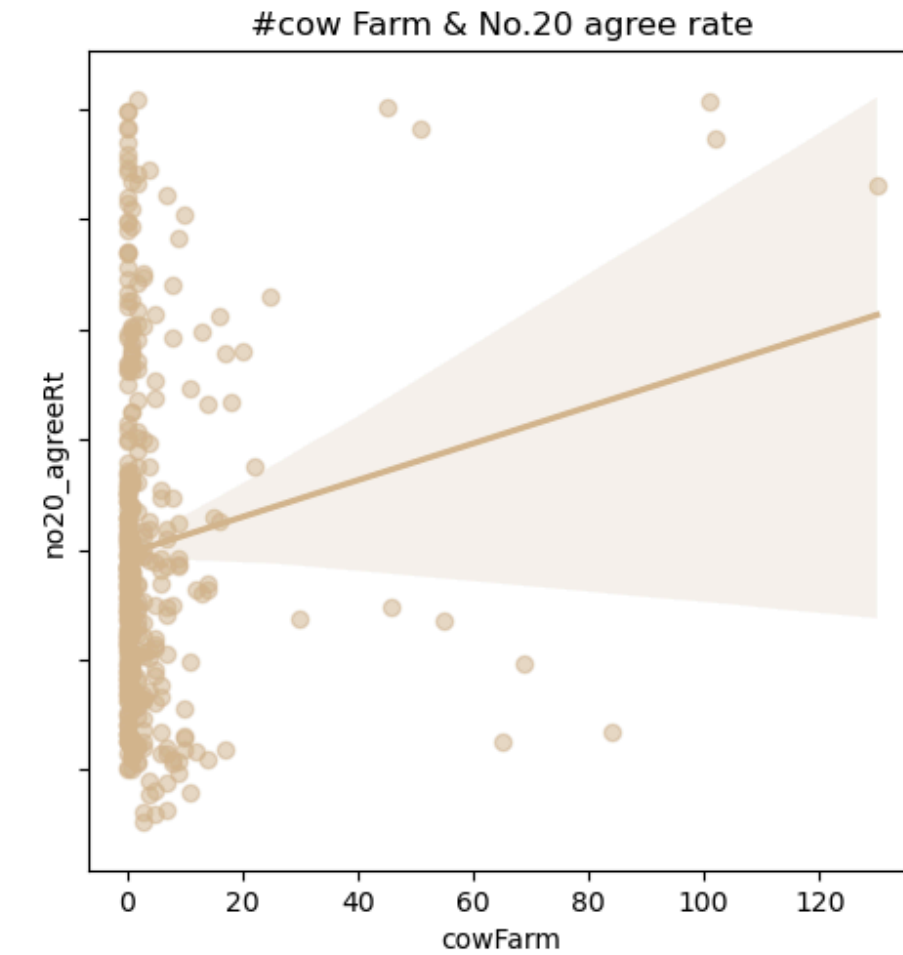
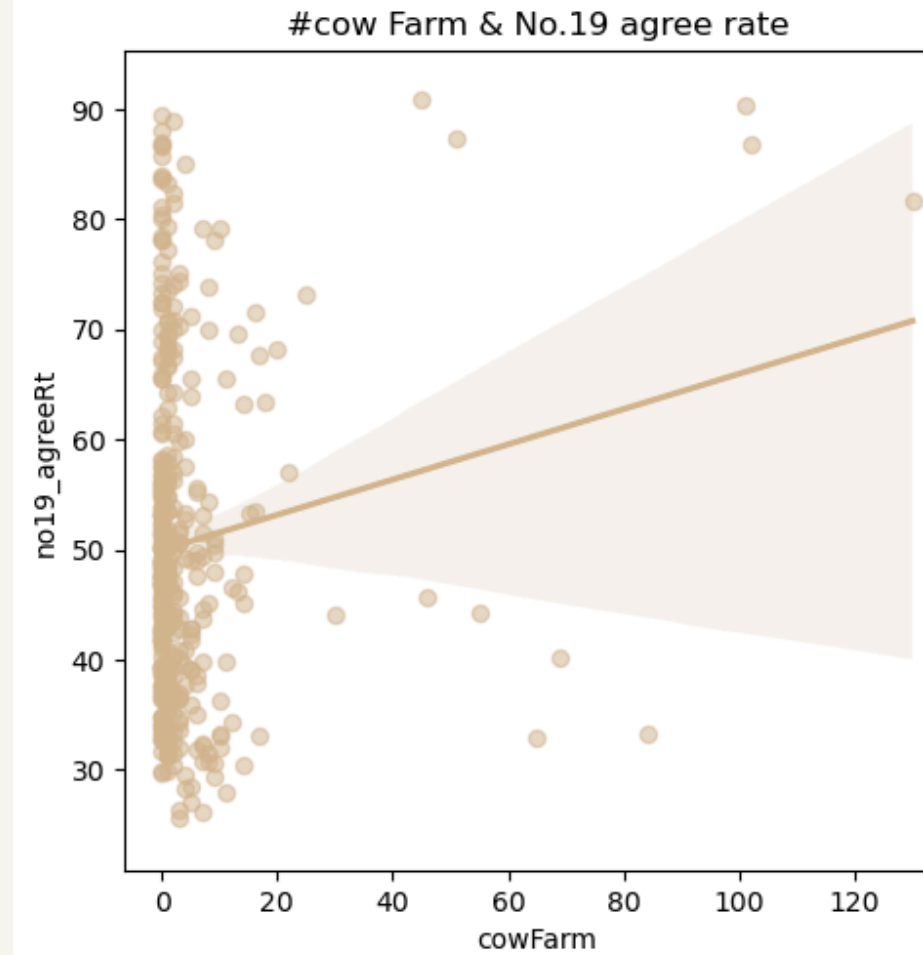
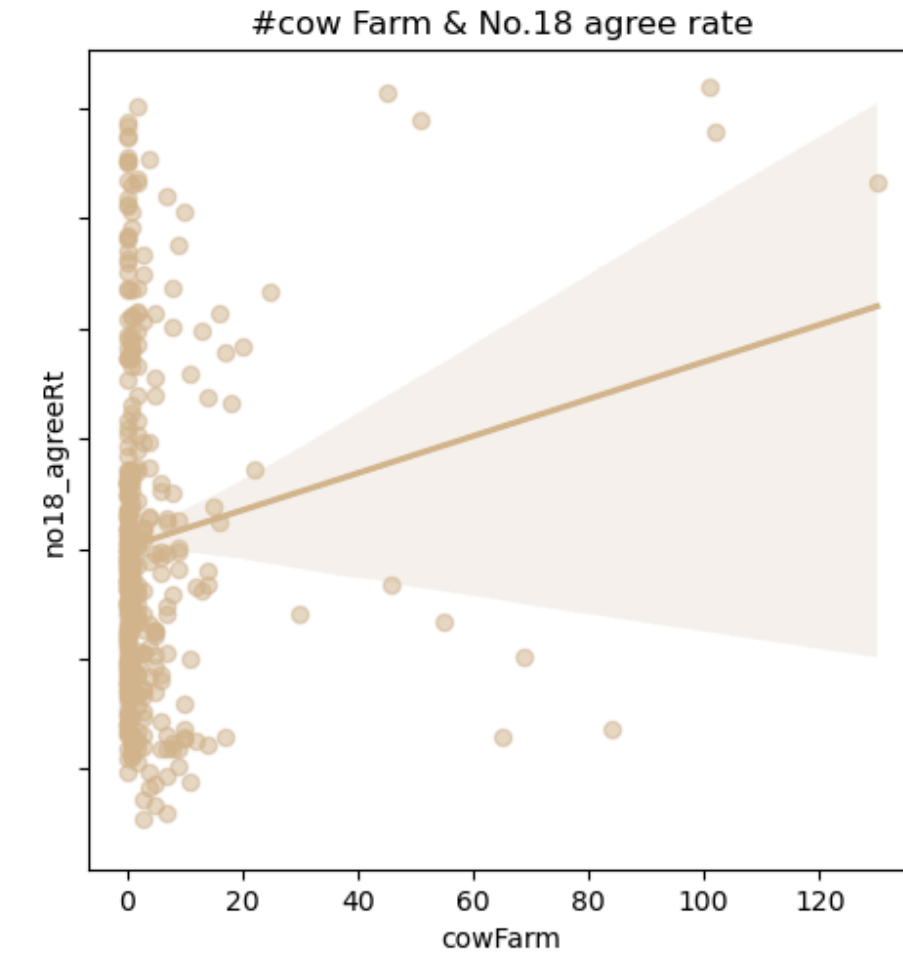
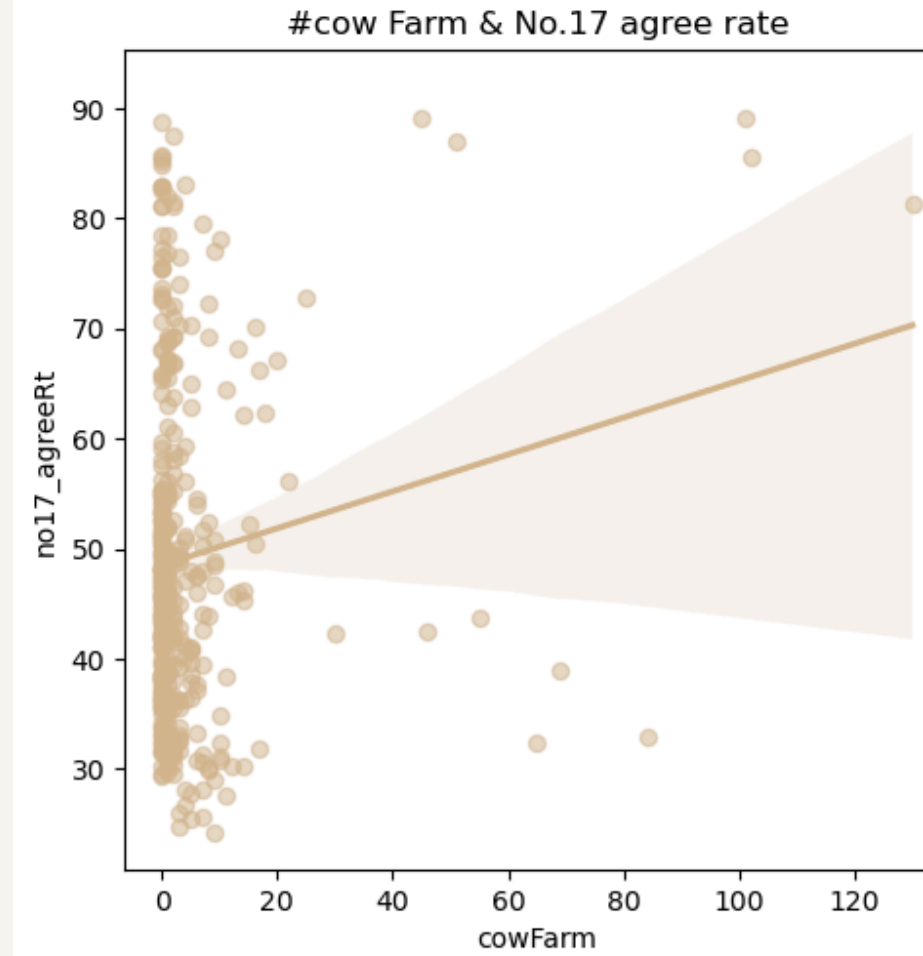
Relationships Between the Number of pig Farms and the Agree Rate of the 4 Referendums



Industry and agree rate

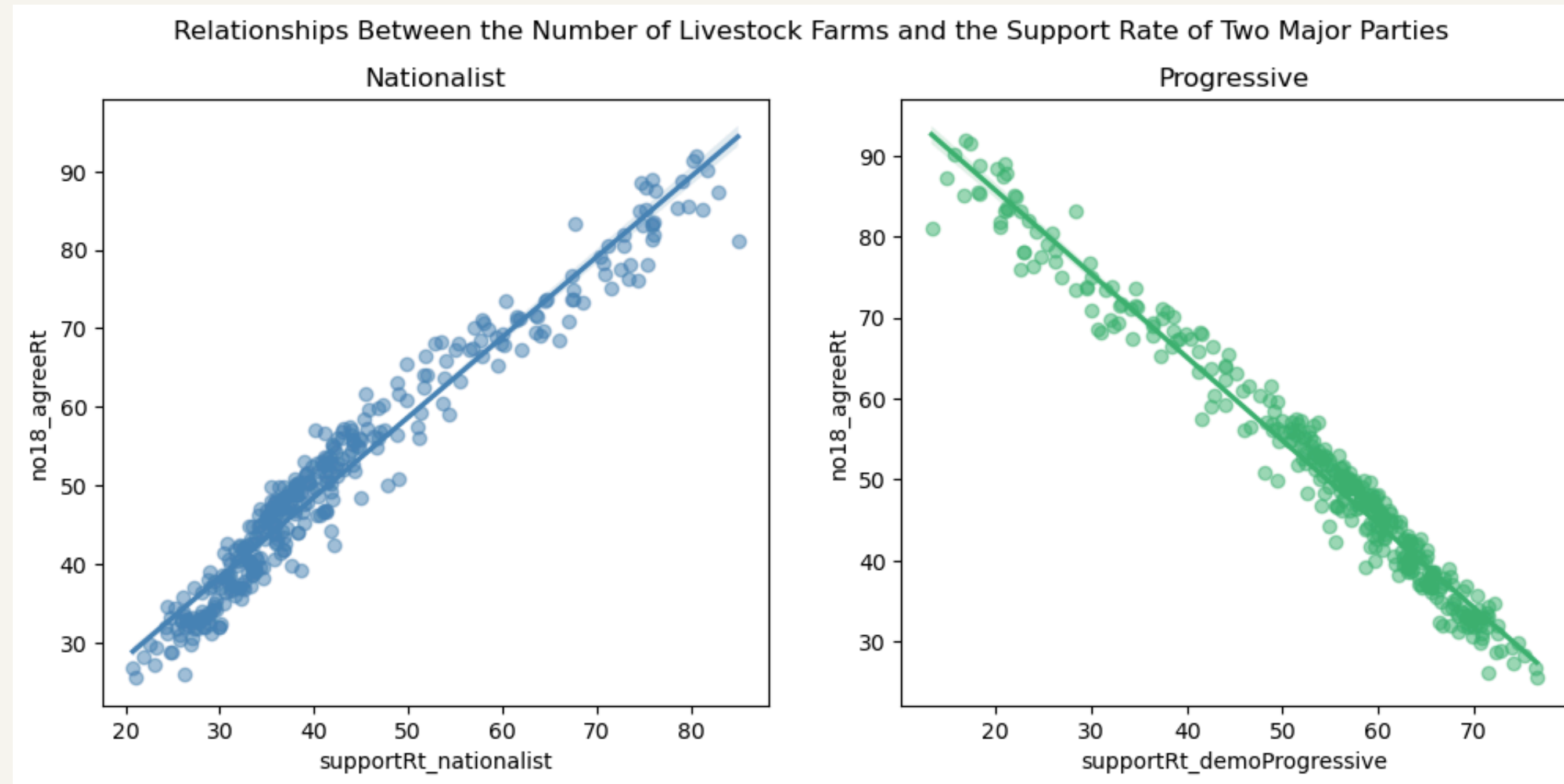
- The influence of the number of cow farms has similar pattern in all 4 referendums

Relationships Between the Number of cow Farms and the Agree Rate of the 4 Referendums



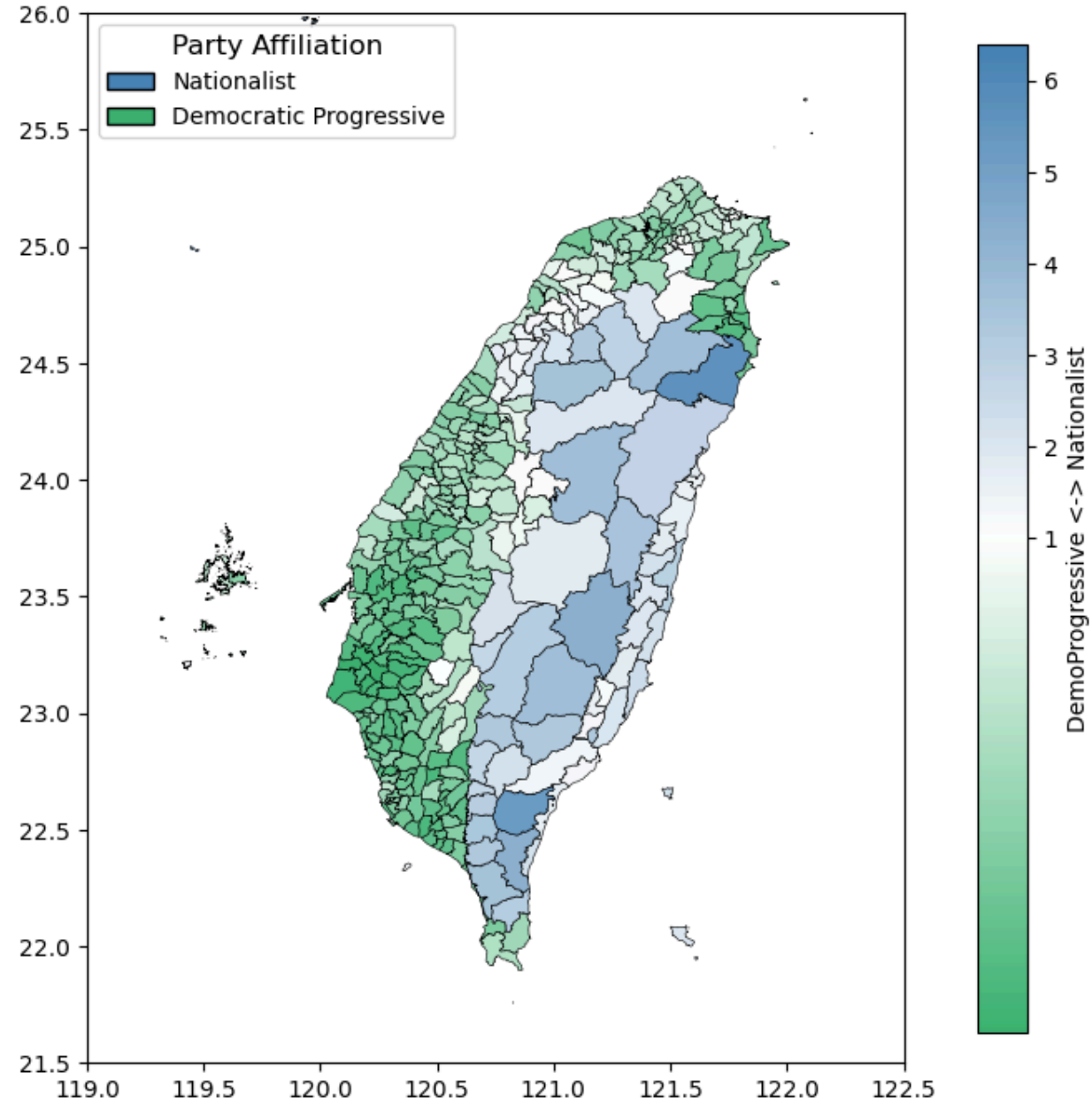
Party and agree rate

- Huh, interesting, but I'm not surprised.
- The agree rates highly correlated with the vote share of Nationalist and Demo progressive in 2020 presidential election.
- This graph just demonstrate the issue is highly polarized by political parties.

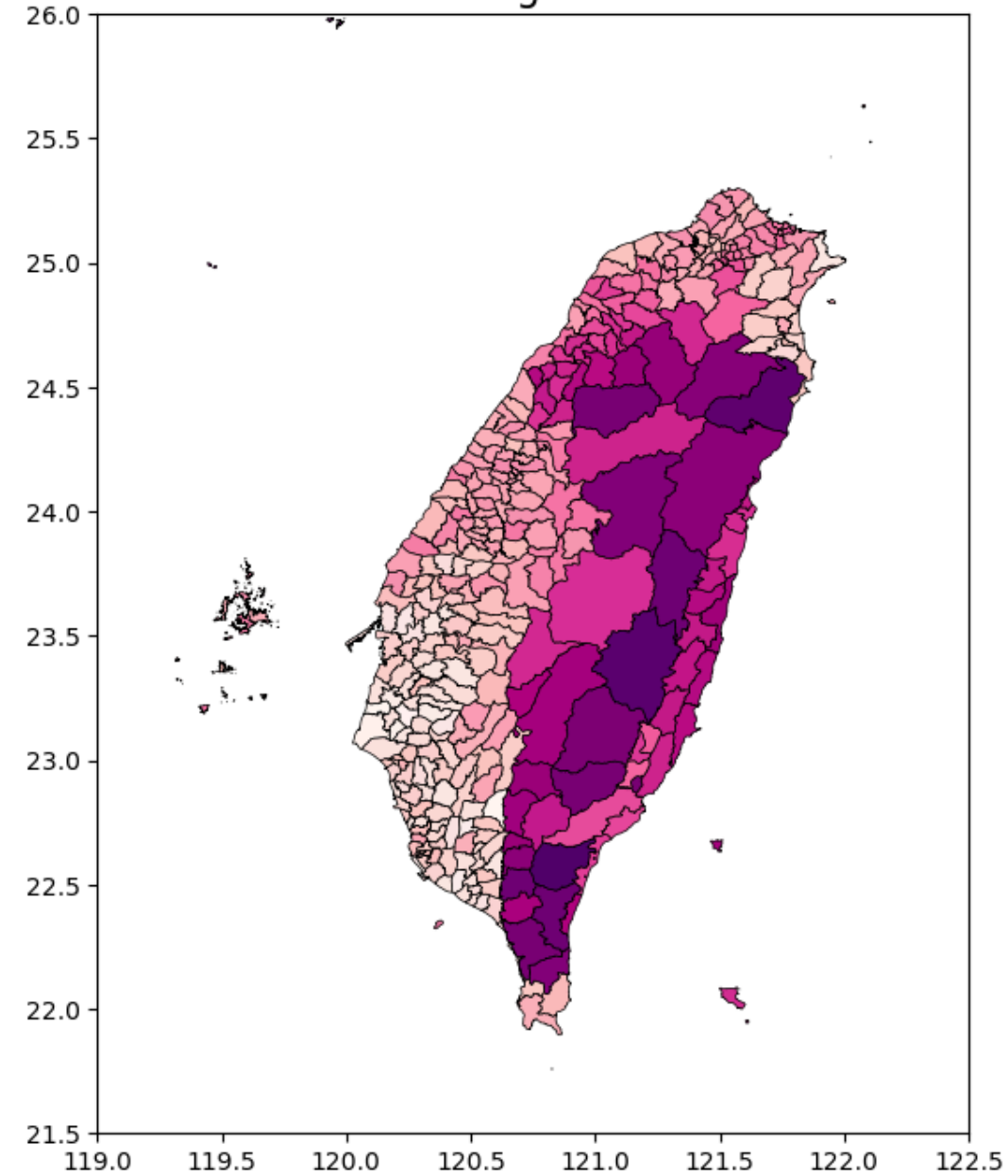


Map

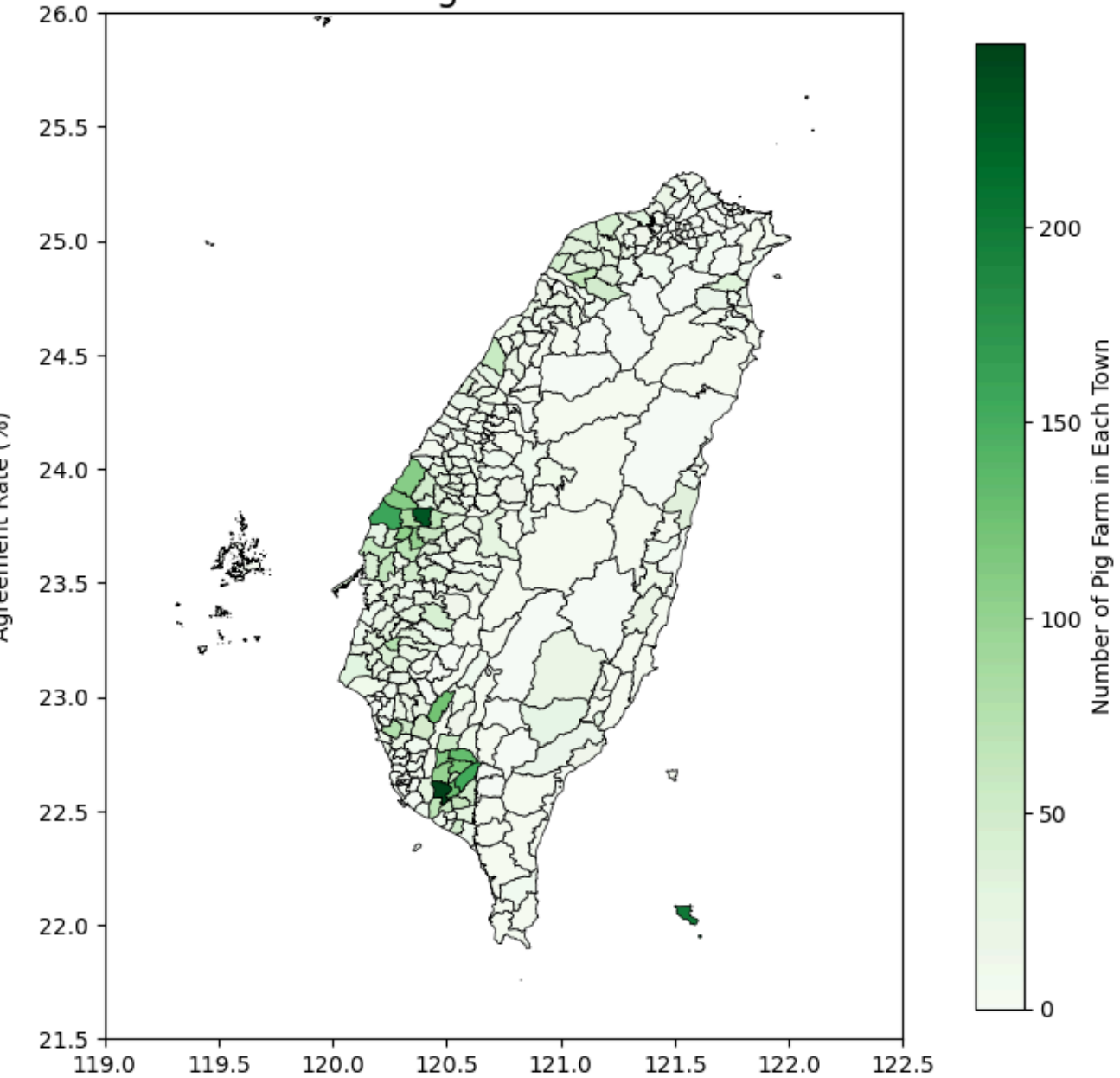
The Vote Share in 2020 Presidential Election of Each Town



No.18 Agree Rate



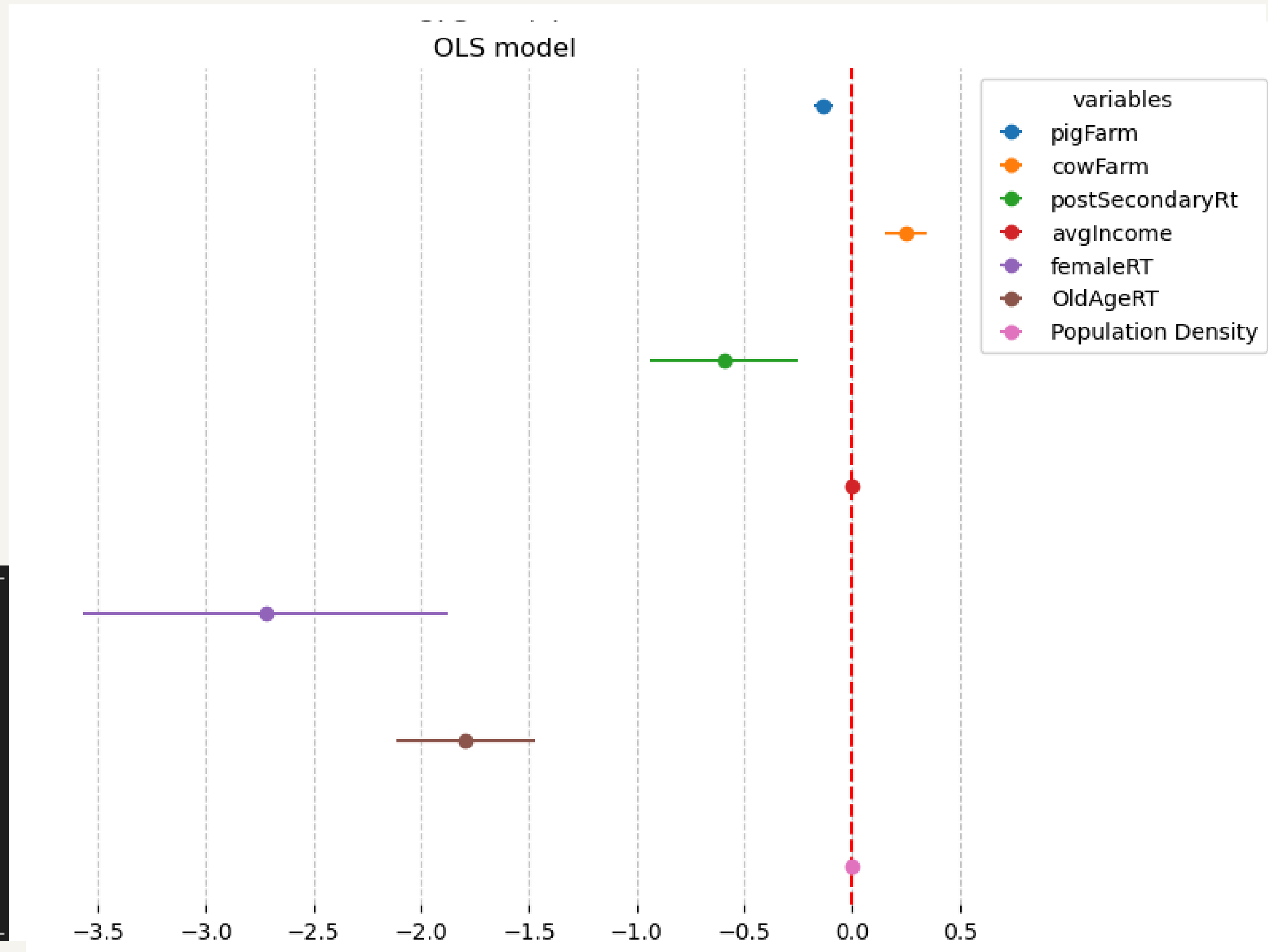
Number of Pig Farm in Each Town



- These three maps just show that the number of pig farm does not related to the agree rate of pork import ban

OLS model

- The coefficient of the number of pig farms is significantly negative, while for cow is significantly positive
- Education, income, gender and age also have significant effects



-----model 1-----

sample size: 368
Intercept: 216.6146

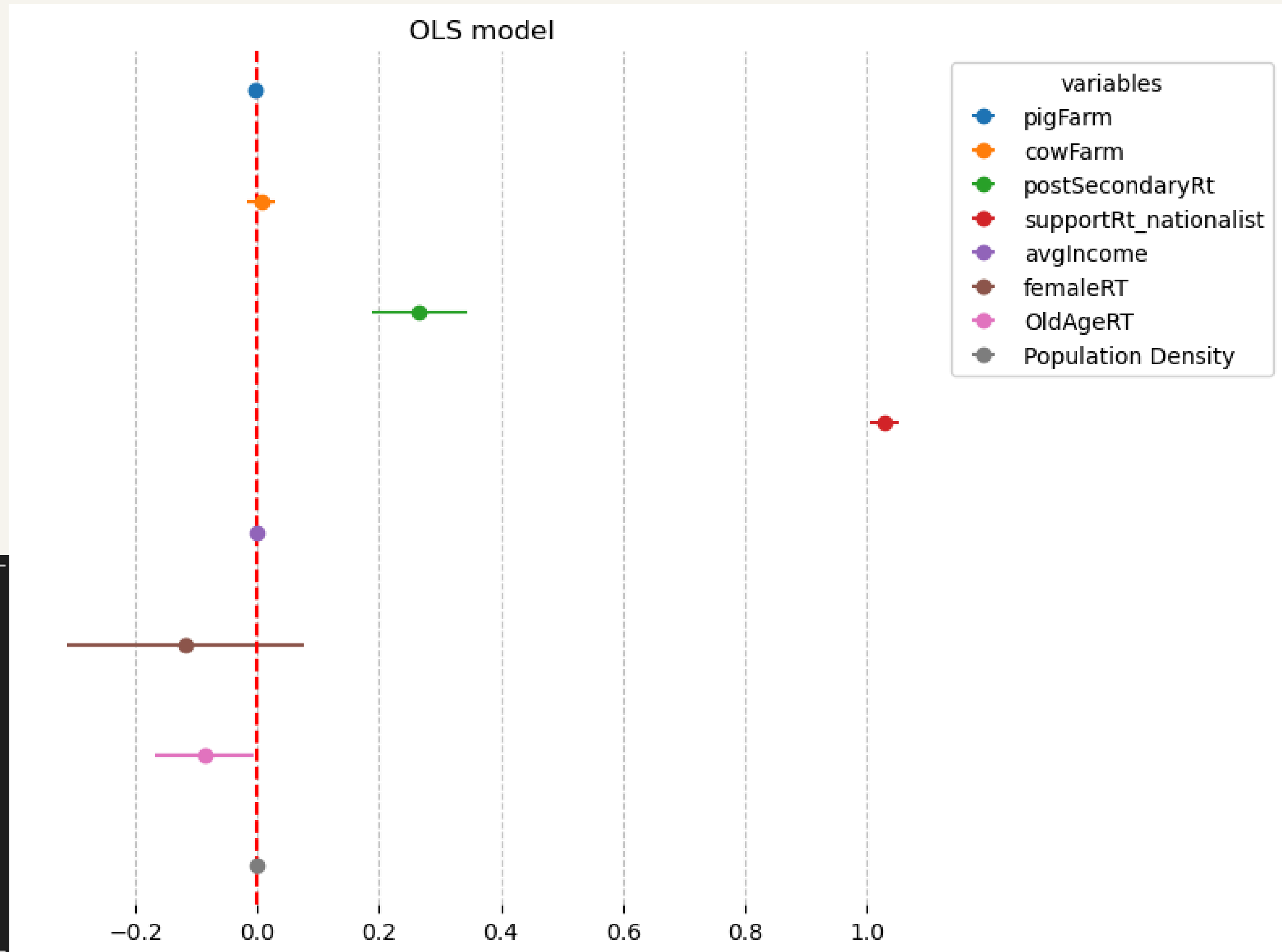
Variable	Coefficient	P-value	Significance
pigFarm	-0.1334	0.0	***
cowFarm	0.2505	0.0	***
postSecondaryRt	-0.5952	0.0008	***
avgIncome	0.0	0.0005	***
femaleRT	-2.7207	0.0	***
OldAgeRT	-1.7927	0.0	***
Population Density	0.0003	0.0725	

R2 = 0.3674
Adjusted R2 = 0.3551
Log-Likelihood: -1437.9539

OLS model

- The significant effect of the number of pig farms disappear after including parties' vote share into our model

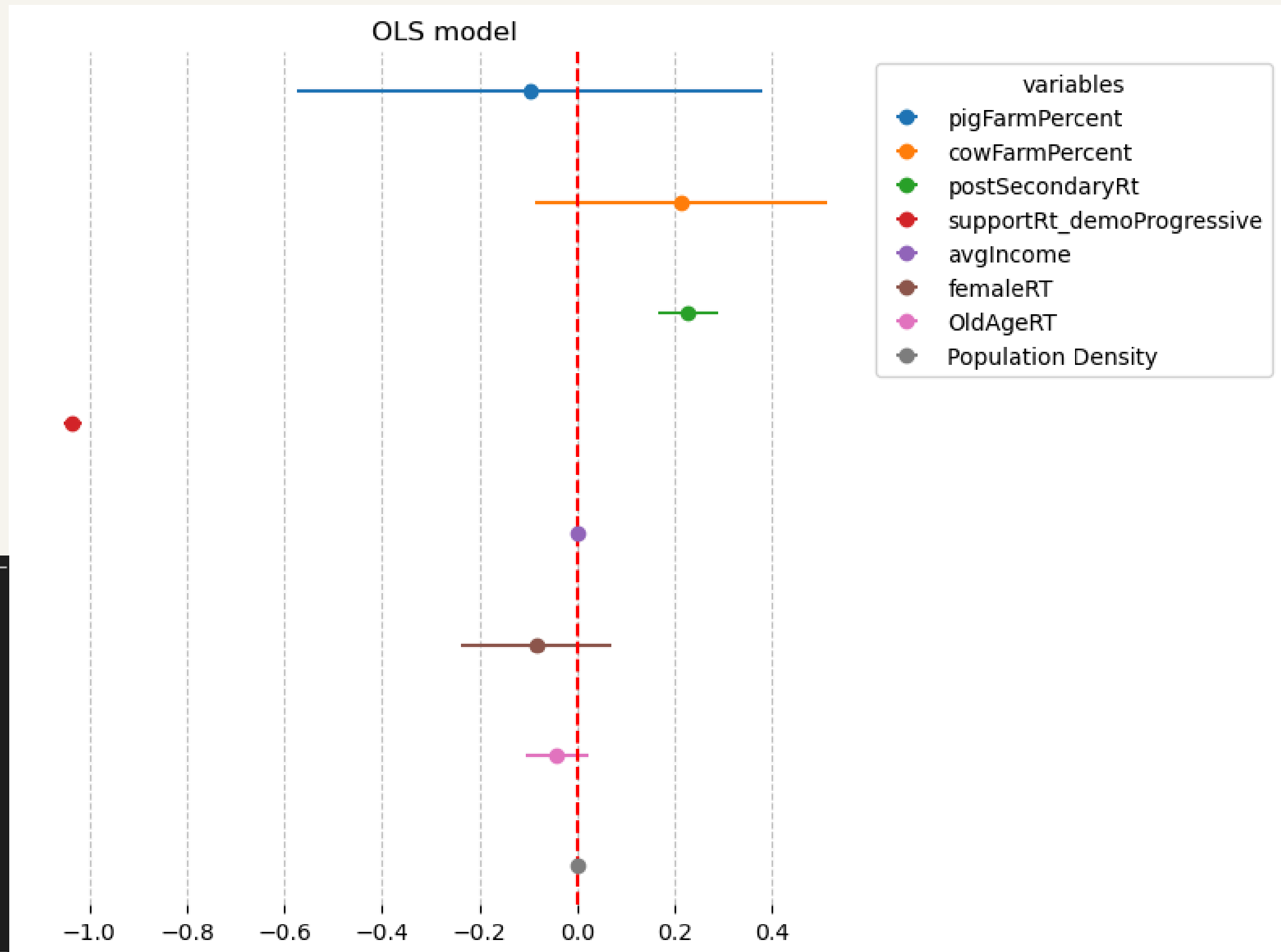
-----model 2-----			
sample size: 368			
Intercept: 8.2565			
Variable	Coefficient	P-value	Significance
pigFarm	-0.0023	0.6427	
cowFarm	0.0061	0.5916	
postSecondaryRt	0.2664	0.0	***
supportRt_nationalist	1.0277	0.0	***
avgIncome	-0.0	0.3357	
femaleRT	-0.1175	0.2385	
OldAgeRT	-0.086	0.039	*
Population Density	-0.0001	0.0068	**
R2 = 0.9696			
Adjusted R2 = 0.9689			
Log-Likelihood: -879.2999			



OLS model

- The significant effect of the number of pig farms disappear after including parties' vote share into our model

model 3			
sample size: 368			
Intercept: 106.3599			
Variable	Coefficient	P-value	Significance
pigFarmPercent	-0.0972	0.6898	
cowFarmPercent	0.2129	0.1614	
postSecondaryRt	0.2273	0.0	***
supportRt_demoProgressive	-1.0346	0.0	***
avgIncome	-0.0	0.1177	
femaleRT	-0.084	0.2885	
OldAgeRT	-0.0418	0.2067	
Population Density	-0.0001	0.0036	**
R2 = 0.9809			
Adjusted R2 = 0.9805			
Log-Likelihood: -794.1440			



Conclusion

- Benefit or **Loyalty**?
- Economic benefit plays a limited role in individuals policy attitudes
- Constituents' loyalty to their parties is the main factor drive their opinion to policies
- What about citizens in different countries?