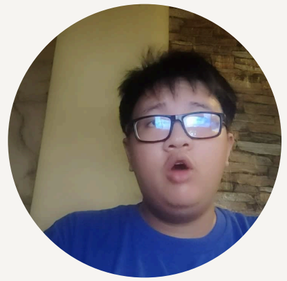
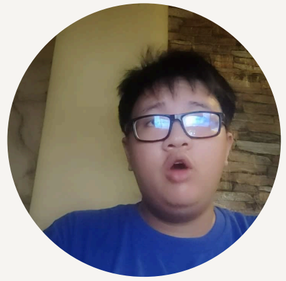


Unveiling the Enablers:

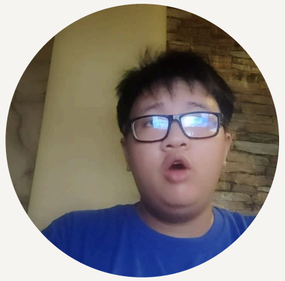
Analyzing the Persistence of Dynasties in Local Philippine Politics

Acuña, Alejandro, Cheng, De Leon, Tagulao – ECON 185.78i Final Project

content

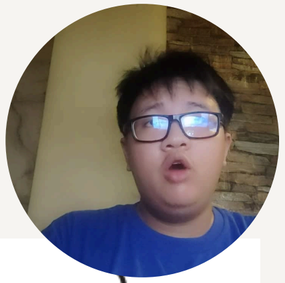


Dynasties in the Philippines ↘



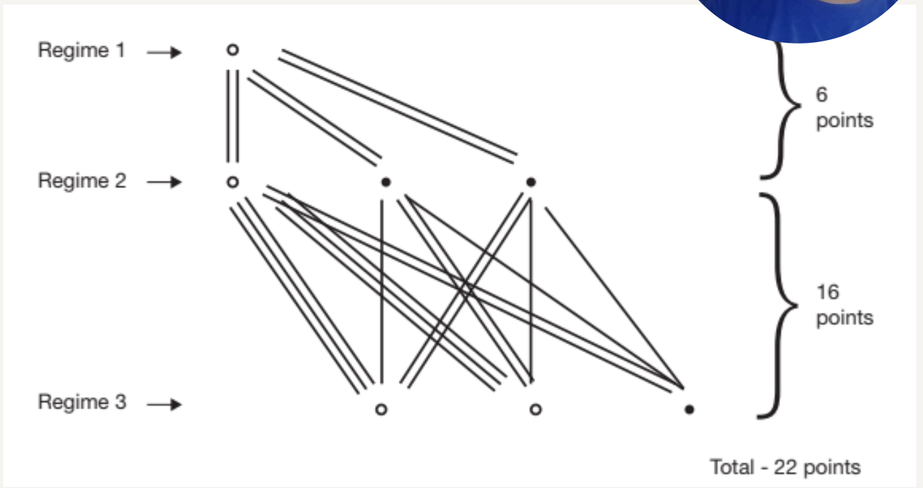
- The Philippines is a **dynastic democracy**
  - In 2010, the provincial governor and congressman were related in roughly 40% of provinces (Querubin, 2012)
  - Almost 80% of Congressmen in 2019 belonged to a political family (Mendoza et al., 2022)
- It is long theorized though that the accumulation of power in familiar networks has been **theorized to erode institutional accountability**, hampering democracy.

Dynastrees in Metro Manila ↘



- Balanquit et al. (2017), attempted to measure a ruling family's prominence by proposing a dynamic index anchored on the **weighted number of binary linkages**

- The share of the political power of each family are then computed. **However, this paper only proposed a method for quantifying.**

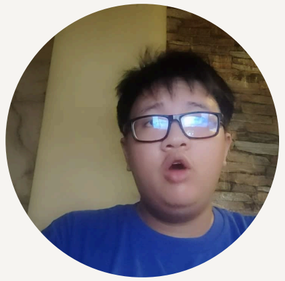


Note: The figure taken from the study only shows the vertical linkages. The horizontal linkages are then added for a total of **34 points**

TABLE 2. The share of political power in the City of Manila (1988-2013)

Political Family	Political power (%)
Lopez	24.7
Bagatsing	20.3
Atienza	12.1
Ocampo	11.3
Lacuna	10.8
Others	20.8

Dynasty and Poverty ↘

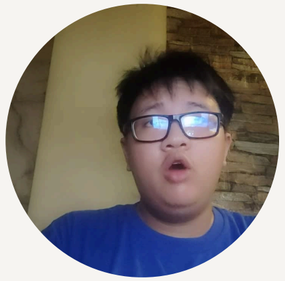


- Mendoza et al. (2016), attempted to identify if political dynasties exacerbated poverty.
- It introduced the notion of “Dynastic Share”, which is the % of all politicians who are part of a dynasty over the total positions. They then used the following equation:

$$POVERTY_t = a + bPOVERTY_{t-1} + c(\ln IRA_{t-1}) + dDYNASTICSHARE_{t-1} + eLUZON + fLUZON * DYNASTICSHARE_{t-1}$$

- They concluded that the **greater prevalence of political dynasties** in the country is **associated with greater poverty in non-Luzon areas only**

Corruption and Poverty ↘



- Davis et al. (2023), proposed a method for quantifying corruption risk indicator (CRI) using the contract quality data from PHILGEPS.
- They then computed the Political Herfindahl–Hirschman Index:

$$HHI = s_1^2 + s_2^2 + s_3^2 + \dots s_n^2$$

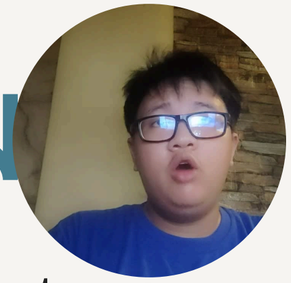
HHI = Herfindahl-Hirschman index

s_i = firm market share

- "Firm market share" is replaced with political seats share
  - Out of all available positions in a given province, how many are occupied by members of a particular family?

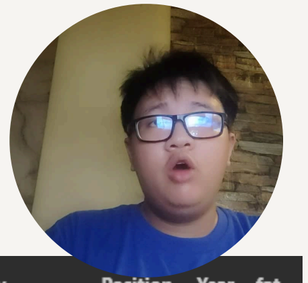
- They concluded that the **the Political HHI** is significantly and positively linked to the **corruption risk indicator.**

But is reverse causality possible?



- Most studies use political HHI as predictors of poverty or corruption, but **examining the reverse causality might also prove to be helpful.** Specifically, we pose the research questions:
  - Is there significant spatial correlation in the Political HHI between neighboring provinces?
  - How do variations in household-level socioeconomic factors related to the concentration of political power?
  - Given the results, what policy interventions can effectively address the persistence of dynasties?

methods ↘ 01 Dataset: HHI Data



- The list of politicians who won the elections (from 2004 – 2016) was taken from ASoG
- Per Year–Province, **the count of the unique last names was tallied** to correspond for the "market share"

	First Name	Last Name	Party	Region	Province	Municipality.City	Position	Year	fat
0	BAMER	AAD	KAMPI	Autonomous Region in Muslim Mindanao	LANAO DEL SUR	CALANOGAS	COUNCILOR	2007	0
1	AMIN	AADAM	INDEPENDENT	Autonomous Region in Muslim Mindanao	LANAO DEL SUR	MAROGONG	COUNCILOR	2004	0
2	AMIN	AADAM	LAKAS-CMD	Autonomous Region in Muslim Mindanao	LANAO DEL SUR	MAROGONG	COUNCILOR	2007	0
3	TRISTAN ROYCE	AALA	IND.	REGION XI	DAVAO DEL NORTE	CITY OF TAGUM	COUNCILOR	2010	1
4	SHIRLEY BELEN	AALA	LAKAS-CMD	REGION XI	DAVAO DEL NORTE	NaN	PROVINCIAL BOARD MEMBER	2004	1
...	...	...	...	...	...	...	...	...	...
86229	SERGIO	ZURITA	BAKUD	REGION VII	CEBU	PORO	COUNCILOR	2007	0
86230	AUGUSTOS	ZURITA	BAKUD	REGION VII	CEBU	NaN	COUNCILOR	2013	0
86231	AUGUSTOS	ZURITA	BAKUD	REGION VII	CEBU	NaN	COUNCILOR	2016	0
86232	AUGUSTOS	ZURITA	IND.	REGION VII	CEBU	PORO	COUNCILOR	2010	0
86233	SERGIO	ZURITA	NPC	REGION VII	CEBU	PORO	COUNCILOR	2004	0

Example:

For Camiguin–2007, suppose there are

- 17 Alejandro
- 5 Cheng
- 3 Tagulao

The Political HHI for Camiguin–2007 will be:

$$HHI = 10000\left(\left(\frac{17}{25}\right)^2 + \left(\frac{5}{25}\right)^2 + \left(\frac{3}{25}\right)^2\right)$$

which equates to 5168

methods

01 Dataset: Geographic Data

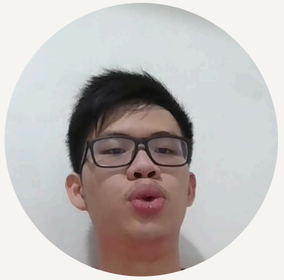
- Obtained shapefile: Level 2: Provinces and Districts from github
- Matched provinces
  - Fixed inconsistencies with provinces in HHI data
    - Maguindanao; Maguindanao del Sur & Maguindanao del Norte
- Original data: geometry only
  - computed for coordinates (lat/lon) to use for spatial analysis
- Further grouped into major island groups in the Philippines
  - Luzon, Visayas, Mindanao

	X	2004	2007	2010	2013	2016	lon	lat	Island_Group	geometry
1	LANAO DEL SUR	46.84711	49.89349	68.73035	74.60973	67.80187	124.3362	7.796685	Mindanao	*MULTIPOLYGON (((124.484 8.1...*
2	MAGUINDANAO	126.93136	150.12959	152.62346	115.27281	102.51912	124.3847	7.031549	Mindanao	*MULTIPOLYGON (((124.047 7.3...*
3	SULU	85.17795	91.14583	87.68201	141.89609	96.14512	121.0543	5.953217	Mindanao	*MULTIPOLYGON (((120.6989 6....*
4	BASILAN	137.90100	144.79500	90.66358	97.50297	121.16571	122.0291	6.565456	Mindanao	*MULTIPOLYGON (((121.5931 6....*
5	TAWI-TAWI	109.56903	109.09091	133.92857	131.82160	153.89351	119.9010	5.239002	Mindanao	*MULTIPOLYGON (((118.4204 7....*
6	DAVAO DEL NORTE	88.68584	88.38384	90.67952	90.67952	91.82736	125.6423	7.585208	Mindanao	*MULTIPOLYGON (((125.3794 8....*
7	DAVAO DEL SUR	67.58711	71.00073	67.06114	78.12500	84.87654	125.3453	7.016022	Mindanao	*MULTIPOLYGON (((125.68 7.26...*
8	DAVAO OCCIDENTAL	0.00000	0.00000	0.00000	0.00000	309.05671	125.5406	6.097962	Mindanao	*MULTIPOLYGON (((125.3171 5....*
9	COMPOSTELA VALLEY	98.49184	87.14880	93.65245	96.25390	106.65973	126.0230	7.573137	Mindanao	*MULTIPOLYGON (((126.1577 7....*
10	DAVAO ORIENTAL	96.25390	112.34226	110.85916	109.59940	113.37868	126.2981	7.251031	Mindanao	*MULTIPOLYGON (((126.3683 7....*

methods ↘

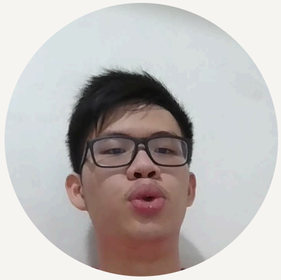
01 Dataset: FIES Data

02 Data Cleaning



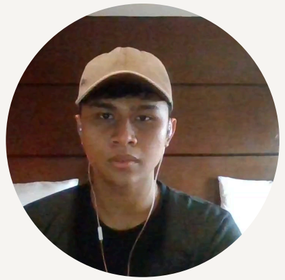
- FIES 2006, 2009, 2012, 2015, 2018 data (link)
  - All Volume 1, except 2009 Volume 2 since Volume 1 was not available
- Select relevant columns from FIES datasets
  - Only columns that appear in all five years
  - Uniformize column names
- Extract province code
  - 2018 was the only year where the province code was explicit
  - Other years had an ID where the first two digits was the province code
  - Load the province code-to-name table from the FIES metadata
  - Convert province codes to province names

methods ↘ 02 Data Cleaning



- Perform data aggregation: Group by province code and take the mean per column (missing data was ignored)
- Create new columns
  - 2006 and 2009: Fruit + Veg. Expenditure; Transpo. + Comm. Expenditure
  - 2012, 2015, 2018: All four columns are individual; new columns were made to align with the granularity of the 2006 and 2009 datasets
- Remove unnecessary columns and non-overlapping rows
  - ID variable, provinces not in both FIES and HHI datasets
- Create a single identifier: Add a year column, then rename the identifier with the province name and the year
- Add the HHI values as a column to the appropriate FIES dataset; note the two-year delay as discussed

methods ↘ 03 OLS Regression



Dataset: Province, Year, Political HHI, FIES Information

- Independent Variables: FIES data
- Target variable: HHI

Data Cleaning

Removed the non-numerical data.

- province-year

1

Log Transformation

$\log(1+x)$

For variables whose skewness is:

- less than -1
- greater than 1

2

VIF Diagnostics

Removed all variables with VIF less than 5.

This is an indication of multicollinearity.

3

methods ↘ 03 OLS Regression

Dataset: Province, Year, Political HHI, FIES Information

- Independent Variables: FIES data
- Target variable: HHI [or log(1+HHI)]

Variable Selection

Hypothesis test:

- **H_0:** the coefficient of the variable is not significant.
- **H_a:** the coefficient is significant.

4

OLS Regression

Hypothesis test:

- **H_0:** no coefficient explain the HHI.
- **H_a:** at least one explains variability in HHI.

5

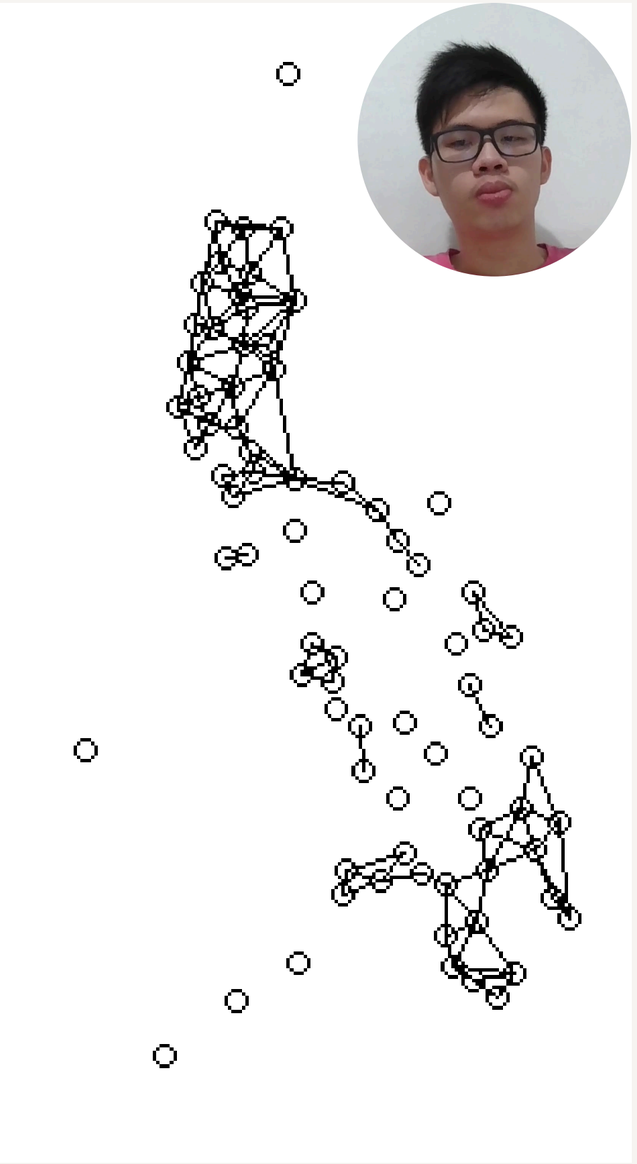
Checking Residual

The residuals are checked if normal using the Anderson–Darling normality test.

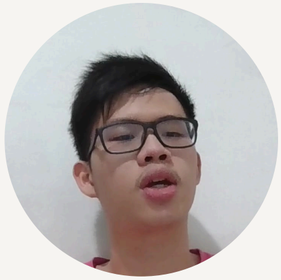
6

methods ↘ 04 Spatial Regression

- Integrating geographical location to predict the dependent variable
- Why use spatial regression?
  - Political HHI is measured per province
  - Presence of dynasties in one province may affect nearby provinces
- Neighbors can be determined by contiguity (shared boundaries) or distance
- Spatial weighted matrix: Another input in the regression model



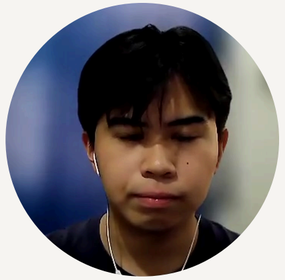
methods ↘ 04 Spatial Regression



- Hypothesis tests
  - Moran's I Test: Measures spatial autocorrelation
    - H_0: The data is randomly dispersed
    - H_a: The data has noticeable clusters
  - Lagrange Multiplier Test for spatial lag/error dependence
    - Spatial lag: HHI of one location is influenced by HHI of neighbors
    - Spatial error: Error terms affecting HHI are spatially correlated
    - H_0: There is spatial lag/error dependence in the data
    - H_a: There is no spatial lag/error dependence in the data

results

01 Exploratory Data Analysis



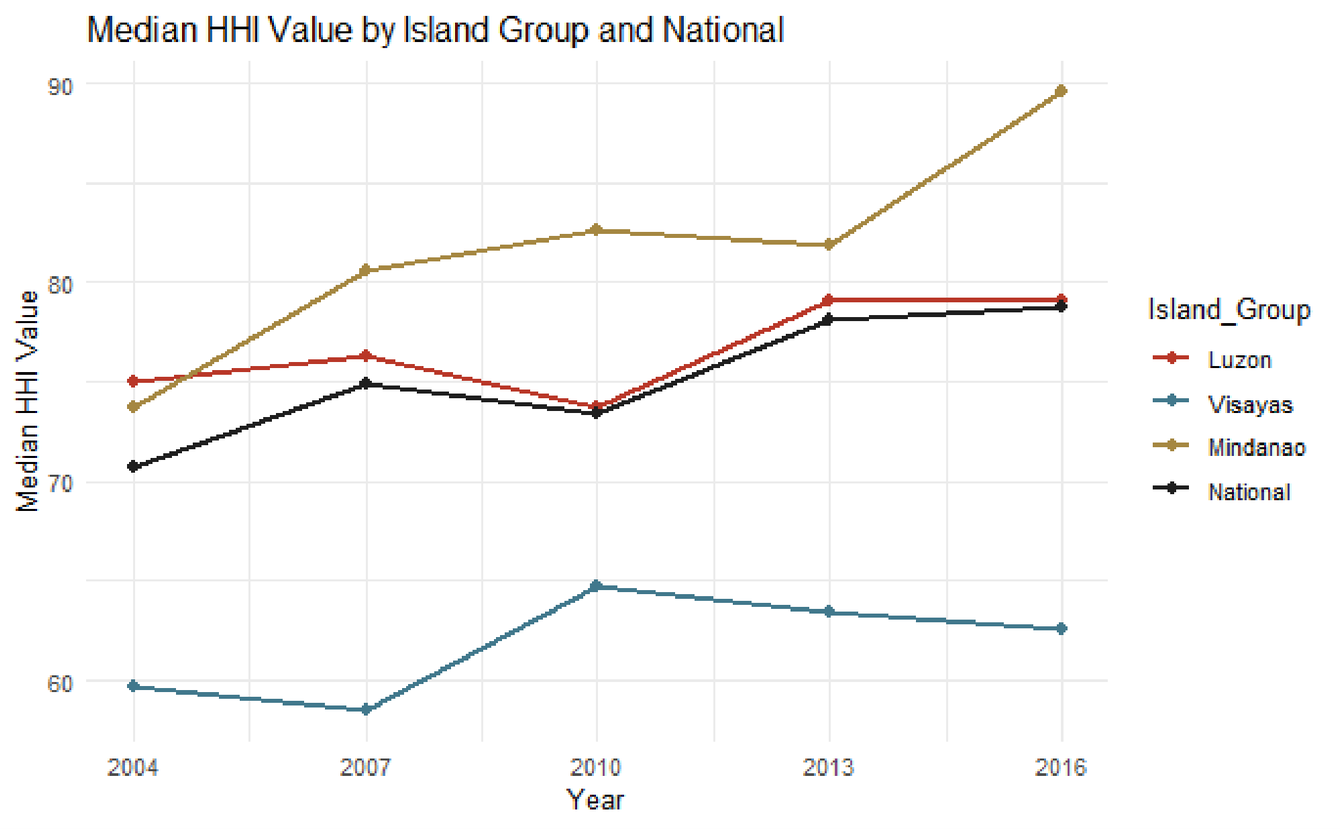


Figure 1. Triannual Median HHI Values per Major Island Group

- Visayas low HHI
- Luzon as a bellwether
- Mindanao has consistently high median HHI as compared to National

results

01 Exploratory Data Analysis

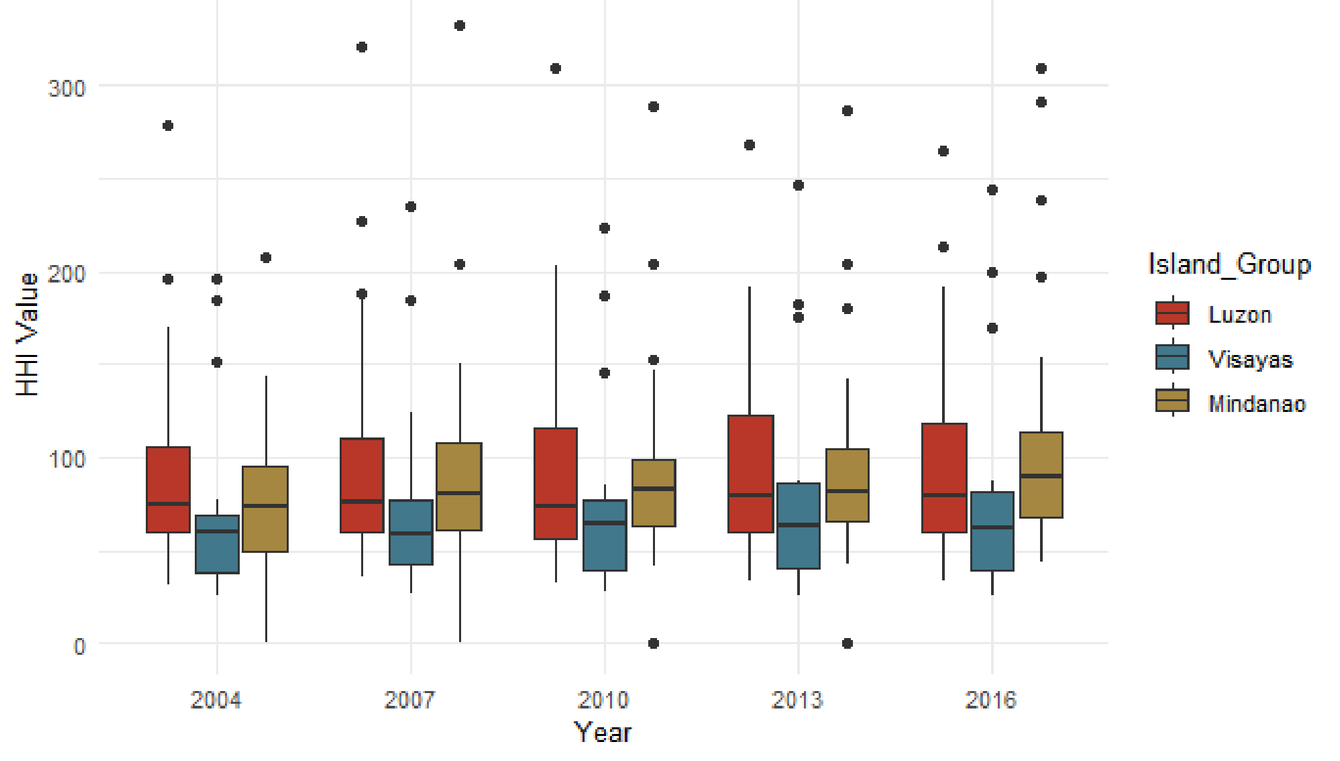


Figure 2. Triannual Box Plots for HHI Values per Major Island Group

- Outliers present for all major island groups
- Almost same behaviors, no dramatic changes

results

01 Exploratory Data Analysis

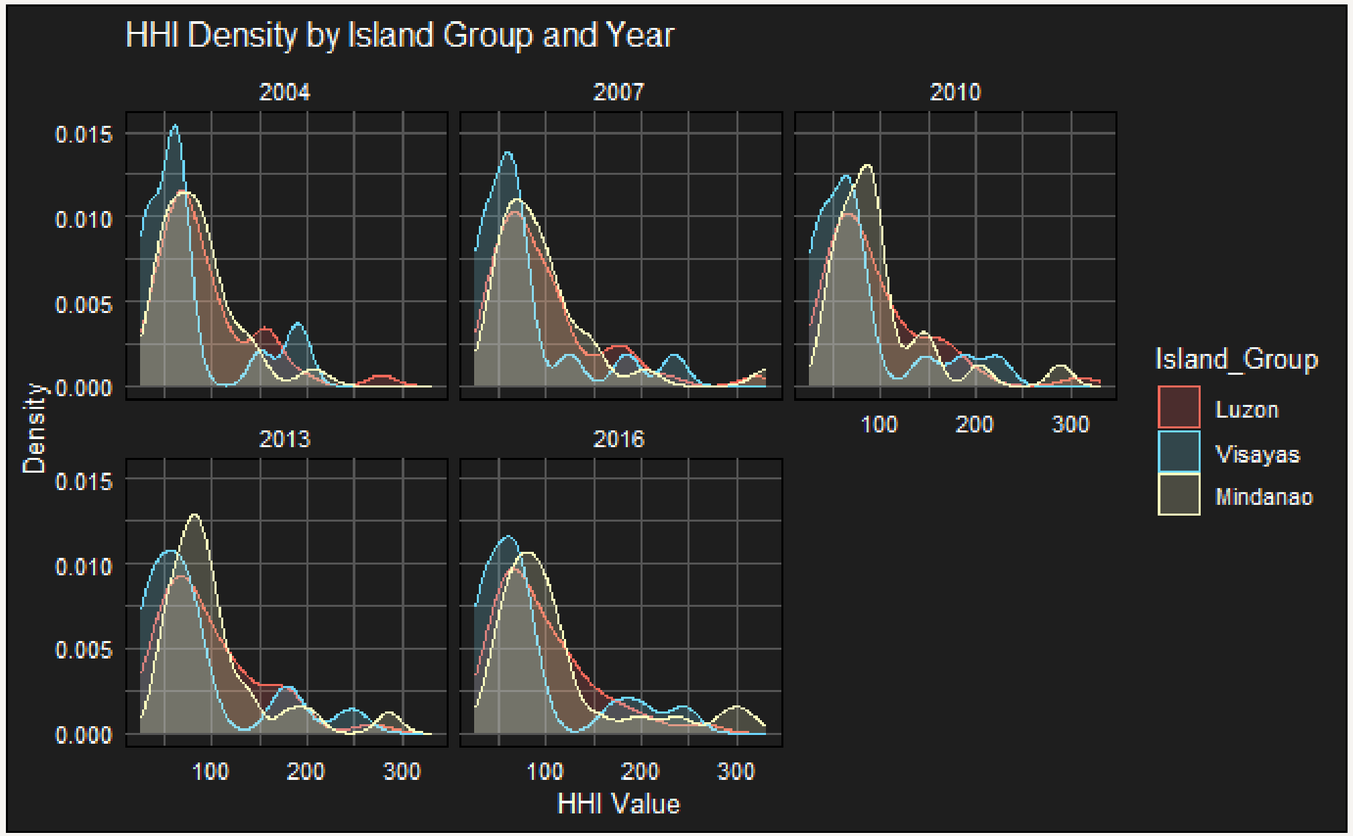


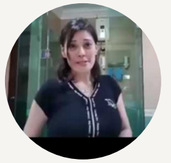
Figure 3. Triannual HHI Density Plot per Major Island Group

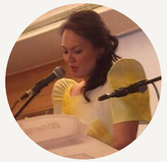
- Small, but still present large HHI values
  - Luzon: Apayao – **Bulut family**



  - Visayas: Siquijor – **Fua family**

  - Mindanao: Dinagat Islands – **Ecleo family**





results

01 Exploratory Data Analysis

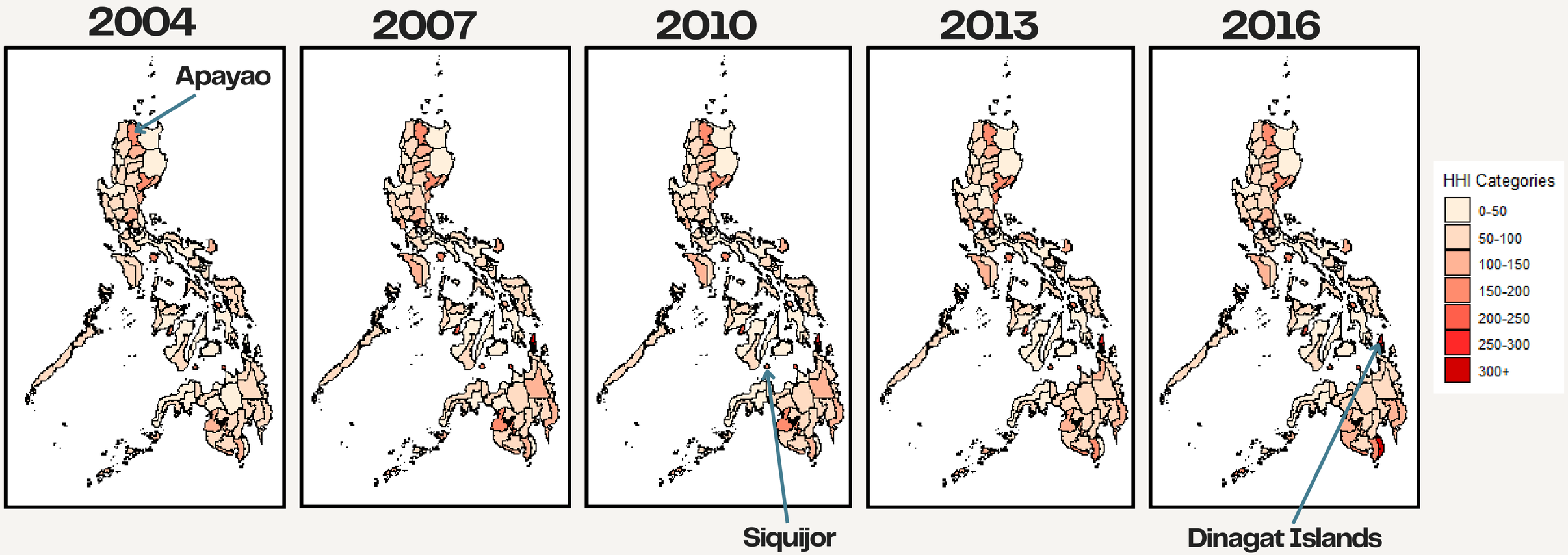
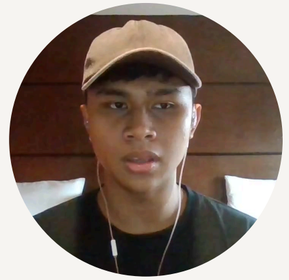


Figure 4. Triannual HHI Values for Philippines, per Province

results

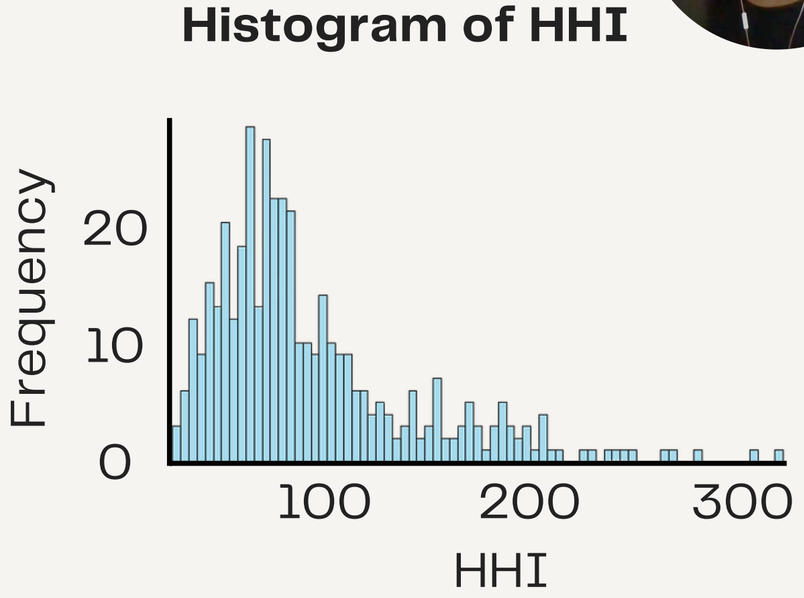
02 **OLS Regression**



1 Skewness Check: threshold of −1 and 1

- 40 variables are skewed
- independent variables like **wages**, **net share of crops**, and **interest** (among 36 more) are skewed
- the target variable, HHI, is also skewed

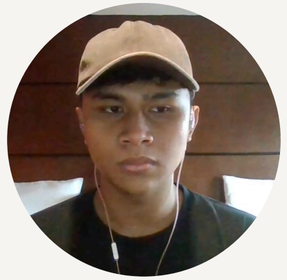
2 VIF diagnostics: only **21 factors** are not exhibiting multicollinearity, which are as follows



FSIZE, CASH_DOMESTIC, LOG_NETSHARE, LOG_RENTALS_REC, LOG_INTEREST, LOG_PENSION, LOG_DIVIDENDS, LOG_OTHER_SOURCE, LOG_REGFT, LOG_NET_LPR, LOG_NET_FISH, LOG_NET_FOR, LOG_NET_RET, LOG_NET_MFG, LOG_NET_COM, LOG_NET_TRANS, LOG_NET_MIN, LOG_NET_CONS, LOG_NET_NEC, LOG_TOBACCO, LOG_FRUITVEG

results

02 **OLS Regression**



3 Variable Selection

According to the p-values of their coefficients, these **10 factors** are significant:

FSIZE, CASH_DOMESTIC, LOG_NETSHARE, LOG_RENTALS_REC, LOG_INTEREST, LOG_PENSION, LOG_DIVIDENDS, LOG_OTHER_SOURCE, LOG_REGFT, LOG_NET_LPR, LOG_NET_FISH, LOG_NET_FOR, LOG_NET_RET, LOG_NET_MFG, LOG_NET_COM, LOG_NET_TRANS, LOG_NET_MIN, LOG_NET_CONS, LOG_NET_NEC, LOG_TOBACCO, LOG_FRUITVEG

4 Final Regression

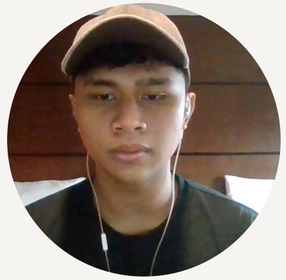
OLS Regression was done using the selected variables.

- All 10 factors remained significant (coefficients are below)

- LOG_NETSHARE [-0.0523]
- LOG_PENSION [-0.0509]
- LOG_REGFT [0.3160]
- LOG_NET_LPR [-0.1158]
- LOG_NET_FISH [-0.0266]
- LOG_NET_FOR [-0.0311]
- LOG_NET_RET [-0.0823]
- LOG_NET_COM [-0.0301]
- LOG_NET_CONS [-0.0257]
- LOG_NET_NEC [-0.0675]
- Intercept [5.120]

results

02 OLS Regression



OLS Regression Model Summary

H_0: The coefficients of all the variables are statistically zero.

H_a: The coefficient of at least one variable is not zero, making the model significant.

- The p-value of the F-statistic of the model is **$p = 2.2 \times 10^{-16} < 0.05$**.
  - **The model is significant.**
- The R-squared is 0.2741.
  - Around 0.2741 of the (log of) political HHI is explainable by the 10 variables.

Anderson-Darling Normality Test

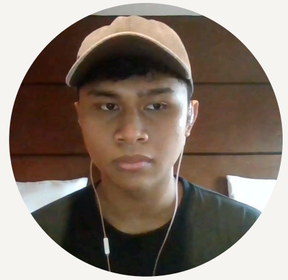
H_0: The residuals are normally distributed.

H_a: The residuals are not normally distributed.

- The p-value is **$p = 0.9098 > 0.05$**.
  - The residuals of the model is in normal distribution.
- **The model is valid.**

results

02 OLS Regression



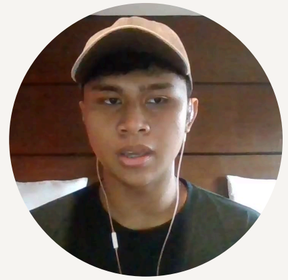
Interpretation of Coefficients

For every 1 unit increase of this...	The LOG_HHI experiences
LOG_REGFT	0.3160 increase
LOG_NETSHARE	0.0523 decrease
LOG_PENSION	0.0509 decrease
LOG_NET_LPR	0.1158 decrease
LOG_NET_FISH	0.0266 decrease
LOG_NET_FOR	0.0311 decrease
LOG_NET_RET	0.0823 decrease
LOG_NET_COM	0.0301 decrease
LOG_NET_CONS	0.0257 decrease
LOG_NET_NEC	0.0675 decrease

- If **LOG_NETSHARE increases** by 1 unit, **LOG_HHI will decrease** by 0.0523 unit.
- Only **LOG_REGFT** has **positive relationship** with HHI, the rest have **negative relationship** with it.
- **LOG_REGFT** and **LOG_NET_LPR**, are highly significant and have a substantial effect on **HHI**, with **LOG_REGFT** showing the most substantial **positive effect**.

results

02 OLS Regression



Interpretation of Variables

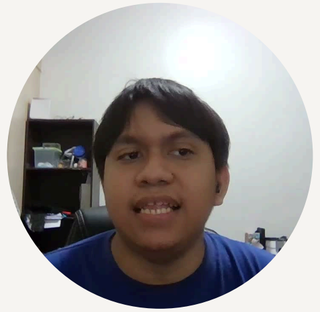
- **LOG_REGFT:** regions with higher regular employment rates experience higher political power concentration.
- **LOG_NET_LPR:** higher income from livestock, poultry, and related products is associated with less political power concentration.

Interpretation of Overall Model Fit

- Independent variables in the model explain **29.2% of the variation** in the logarithmic transformation of the incidence of monopoly of power.
- Sectors like commerce, agriculture, and fishing show negative relationships with political power concentration, emphasizing that economic diversification may foster political competition and inclusivity.

results

03 Spatial Autocorrelation



Using **contiguity approach** produces significant **spatial error dependencies**

```
        Moran I test under randomisation

data:  FIES_HHI$AVG_HHI
weights: PH_list
n reduced by no-neighbour observations

Moran I statistic standard deviate = 2.1678, p-value = 0.01509
alternative hypothesis: greater
sample estimates:
Moran I statistic       Expectation          Variance
      0.198679015      -0.015151515       0.009730103
```

Result of **Moran's I Test** using **contiguity** as measure of spatial distance

```
        Rao's score (a.k.a Lagrange multiplier) diagnostics for spatial dependence

data:
model: lm(formula = AVG_HHI ~ . - Province, data = FIES_HHI)
test weights: listw

RSlag = 0.056866, df = 1, p-value = 0.8115
```

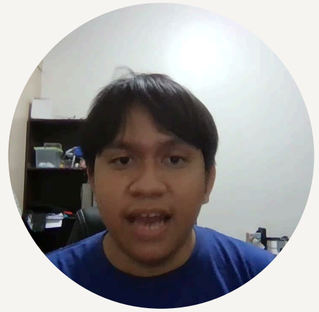
Result of **Lagrange Multiplier** for **spatial lag dependence** (not significant)

```
        Rao's score (a.k.a Lagrange multiplier) diagnostics for spatial dependence

data:
model: lm(formula = AVG_HHI ~ . - Province, data = FIES_HHI)
test weights: listw

RSerr = 6.0215, df = 1, p-value = 0.01413
```

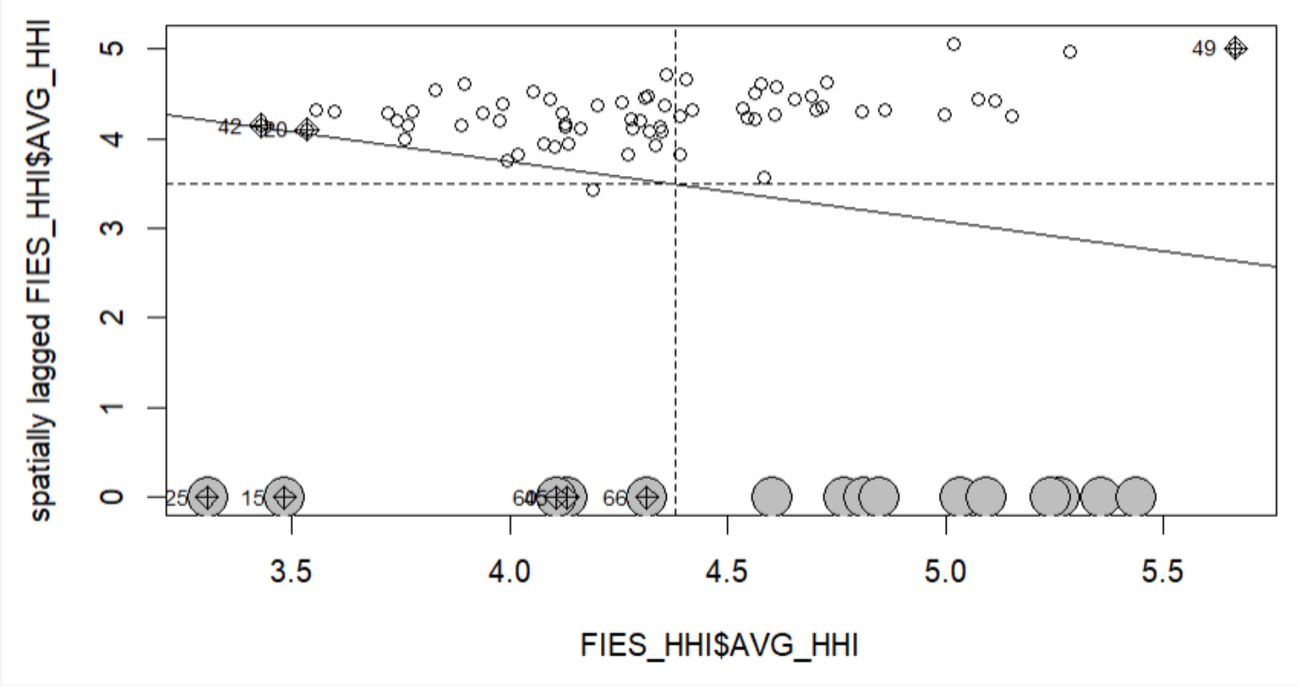
Result of **Lagrange Multiplier** for **spatial error dependence** (not significant)

results

03 Spatial Autocorrelation



Using **contiguity approach** produces significant **spatial error dependencies**

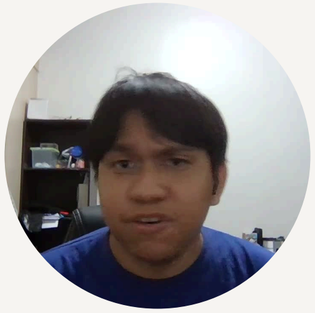


Moran scatterplot of original vs. spatially lagged AVG_HHI values

NOTE: Zero values are resulted by PH geography wherein the country is separated by major islands (and hence some provinces are **not connected** with each other)

results

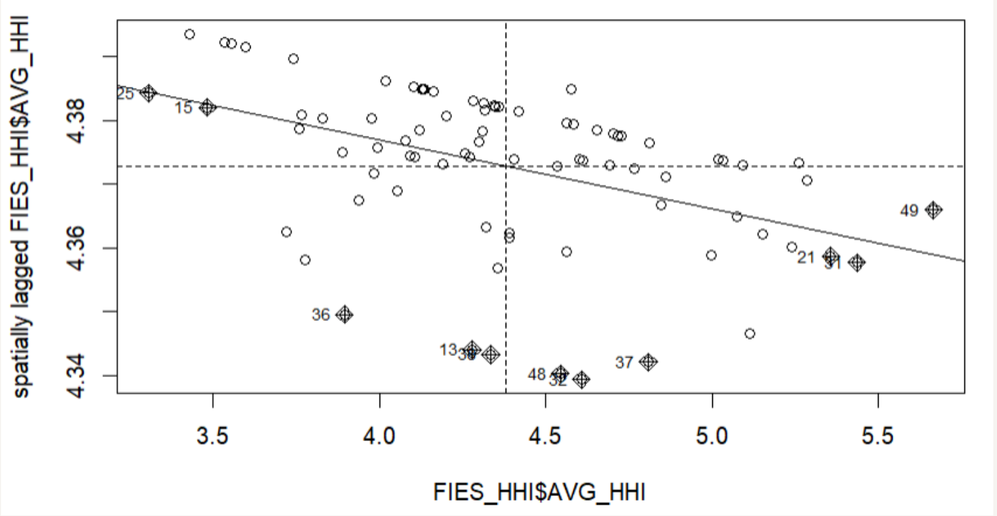
03 **Spatial Autocorrelation**



Meanwhile, **distance weight matrix** does not provide any significant spatial correlation

```
        Moran I test under randomisation

data:  FIES_HHI$AVG_HHI
weights: PHlistw_D

Moran I statistic standard deviate = 0.32945, p-value = 0.3709
alternative hypothesis: greater
sample estimates:
Moran I statistic       Expectation          Variance
    -1.077295e-02     -1.234568e-02      2.278893e-05
```

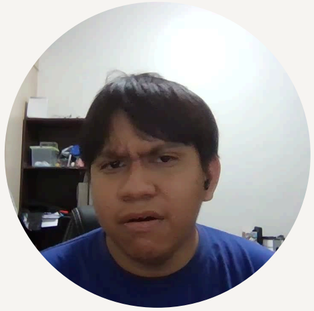
Result of **Moran's I Test** using **distance weight matrix**



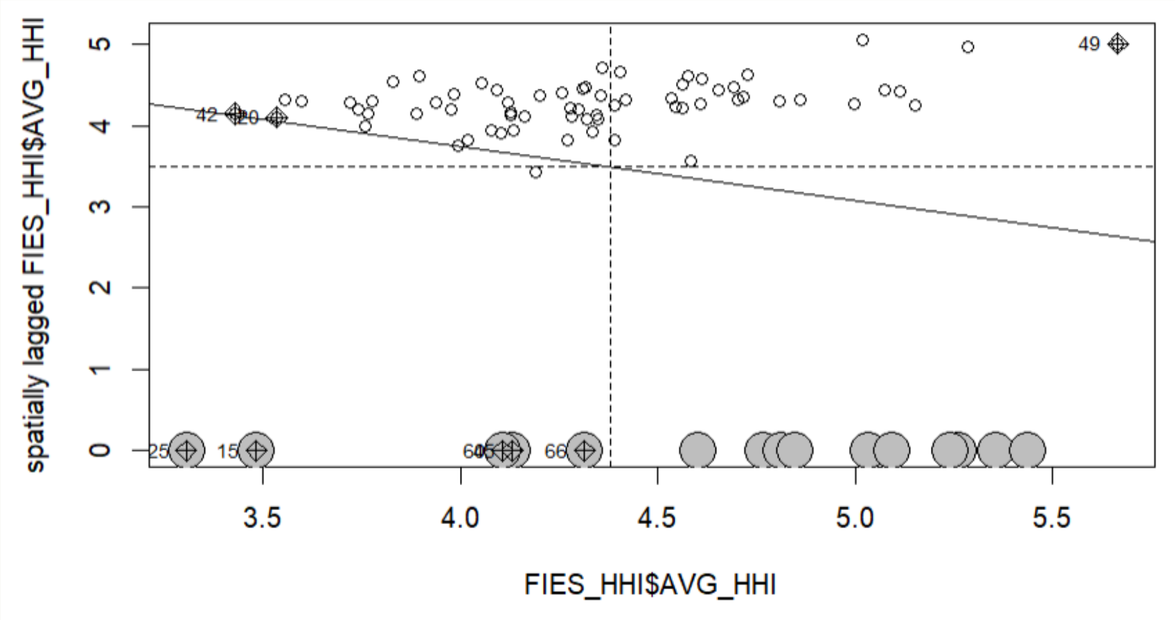
Moran scatterplot of original vs. spatially lagged AVG_HHI values

results

03 **Spatial Autocorrelation**



Interpretation



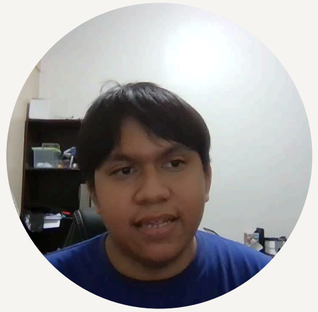
Moran scatterplot of original vs. spatially lagged AVG_HHI values

(Spatial) correlations are present in measuring provincial HHI values and is caused by **inconsistencies on defining exact boundaries of provinces** (contiguity) against neighboring ones.

Hence, addressing such issue is important to **make inferences** on regression (like OLS) **more robust.**

results

03 Spatial Autocorrelation



```
Residuals:
      Min        1Q    Median        3Q       Max
-0.777705 -0.295775  0.051076  0.307760  0.497642

Type: error
Regions with no neighbours included:
 9 11 14 15 21 23 25 31 44 45 60 66 69 74 78
Coefficients: (asymptotic standard errors)
              Estimate Std. Error z value  Pr(>|z|)
(Intercept)   2.548027   1.720531  1.4810  0.138619
AVG_NETSHARE -0.043346   0.064830 -0.6686  0.503747
AVG_PENSION  -0.065883   0.069247 -0.9514  0.341392
AVG_REGFT     0.567360   0.141386  4.0128 5.999e-05
AVG_NET_LPR  -0.130842   0.064363 -2.0329  0.042065
AVG_NET_FISH -0.028840   0.025407 -1.1351  0.256335
AVG_NET_FOR  -0.067490   0.033963 -1.9872  0.046906
AVG_NET_RET   0.114191   0.188936  0.6044  0.545585
AVG_NET_COM  -0.097864   0.067721 -1.4451  0.148429
AVG_NET_CONS -0.071487   0.027203 -2.6279  0.008591
AVG_NET_NEC  -0.148342   0.036474 -4.0671 4.760e-05

Lambda: 0.36256, LR test value: 6.6947, p-value: 0.00967
Asymptotic standard error: 0.12003
    z-value: 3.0205, p-value: 0.0025233
Wald statistic: 9.1236, p-value: 0.0025233

Log likelihood: -28.53072 for error model
ML residual variance (sigma squared): 0.11294, (sigma: 0.33607)
Number of observations: 82
Number of parameters estimated: 13
AIC: 83.061, (AIC for lm: 87.756)
```

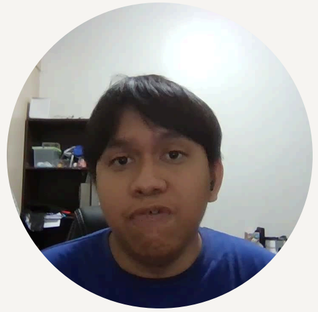
p-value is significant and is an indicator of spatial correlation present in error terms of average log HHI values

Lambda, the spatial error model for correlation's main metric, is positive and high.

- This implies that a **positive spatial correlation** exists

AIC value for spatial error model improved from its predecessor (Simple OLS Regression)

results

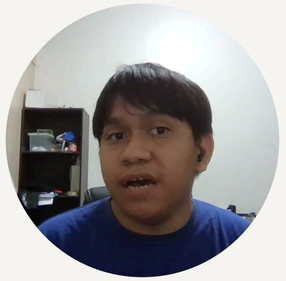


03 Spatial Autocorrelation

Even after **spatial correlation in errors** are addressed, average income in **fishing** (AVG_NET_FISH), **forestry and hunting** (AVG_NET_FOR), **construction** (AVG_NET_CONS), and **entrepreneurial activities** (AVG_NET_NEC) are still **significant.**

	Dependent variable:	
	AVG_HHI	
	OLS	spatial error
	(1)	(2)
AVG_NETSHARE	-0.065	-0.043
	(0.065)	(0.065)
AVG_PENSION	-0.084	-0.066
	(0.077)	(0.069)
AVG_REGFT	0.541***	0.567***
	(0.151)	(0.141)
AVG_NET_LPR	-0.151**	-0.131**
	(0.068)	(0.064)
AVG_NET_FISH	-0.046*	-0.029
	(0.027)	(0.025)
AVG_NET_FOR	-0.043	-0.067**
	(0.037)	(0.034)
AVG_NET_RET	0.147	0.114
	(0.215)	(0.189)
AVG_NET_COM	-0.102	-0.098
	(0.078)	(0.068)
AVG_NET_CONS	-0.070**	-0.071***
	(0.032)	(0.027)
AVG_NET_NEC	-0.139***	-0.148***
	(0.042)	(0.036)
Constant	2.863	2.548
	(1.956)	(1.721)

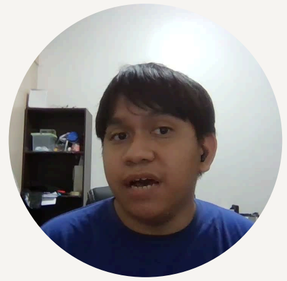
conclusion ↘



Income from goods and services that are location-dependent (fisheries and forestry for **rural areas** while construction and entrepreneurial activity for **highly-urbanized provinces**) can be determinants of worsening political concentration to select political ruling clans in the provincial level.

- Industries mentioned above require permit to operate from municipal offices. Thus, it is possible that businesses working in these sectors may have made a pact/deal in ruling politicians to allow them to operate in exchange for a service
- Possibly, politicians from ruling families may in fact own/share equities within these operations, as observed in Mendoza et al. (2022)

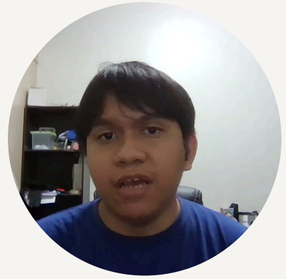
conclusion ↘



Provincial political power aggregations may cause spillovers within their neighboring provinces.

- Can be illustrated by political family members “migrating” to other areas/provinces for them to settle and potentially **run** in the next election (for maintaining political power)
    - Ex: Iloilo governor is the ancestor of political dynasty in Guimaras (Espinosa–Martinez family)
- Can also explain how **political dynasties** in the Philippines are not necessarily centralized over a specific area only but instead goes beyond boundaries (E.g: Case of **Aguilar Family** in Las Pinas and Muntinlupa; Uy/Tan in Visayas)

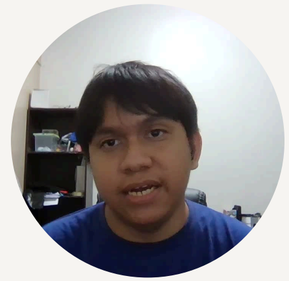
conclusion ↘



Political power aggregation in the country is not only happening **within provincial jurisdiction,** but also **across boundaries.**

- Harmful for maintaining **checks and balances** in the political sphere
- May reduce **political seat competition** to other politicians by diminishing the space where non-dynastic politicians can run and serve the people
- Distress call for the **aggravating problem of political dynasty** in the country
- Worsening political conditions may induce effects in vital operations in the society, such as preserving nature and forest cover present in the province as well as in politicizing market and business operations

conclusion ↘



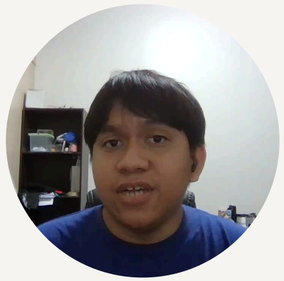
Policy Recommendations

[1] Protect Crucial Sectors of the Society from being Politicized by Dynasties

- Protect sectors of fisheries, farming and agriculture, cultivation, Indigenous People (IPs), and others from being constantly harassed by the government due to self-interested motives by the ruling power
- Improve conditions to these sectors by activating local development action plans

[2] Pass an Anti-Dynasty Bill in Congress to Abhor Political Aggregation

- Must **clearly** state what constitutes **political dynasty** (measured vertically, horizontally, or others)
- Must include provisions on preventing family members from occupying political seats within localities and across boundaries



Unveiling the Enablers:

Analyzing the Persistence of Dynasties in Local Philippine Politics

Acuña, Alejandro, Cheng, De Leon, Tagulao – ECON 185.78i Final Project

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