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The Impact of Socioeconomic Factors on Voter Turnout in the Republic of Korea:

Empirical Research for the Results of 18th and 19th Presidential Elections

Yoon, Hee Yup

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Executive Summary

This study examines the relationship between socioeconomic factors and voter turnout in South Korea. In particular, the determinants of the turnout in the 2012 and 2017 presidential elections in the Republic of Korea are analyzed by using the aggregated data in terms of municipal-level divisions. The findings partially support previous studies. The education level and the percentage of primary industry workers in the district have a significantly positive impact on turnout. Holding the other variables constant, as the proportion of the population over higher education in the district increases, voter turnout grows. Likewise, as the ratio of primary industry workers in the region becomes larger, voter turnout rises. However, income level is negatively associated with voter turnout when holding the other variables constant. As the property tax per capita in municipality increases, voter turnout decreases. This is because the elderly, who make up half of the low-income brackets, are more likely to go to the polls in South Korea.

Key words: (Voter) Turnout, Rational Choice Theory, Socioeconomic Status Model, Presidential Elections, South Korea

Introduction

Today the election is a representation of democracy. This is the reason why the democratic value of the current Constitution of the Republic of Korea, which introduced the presidential direct election system in 1987, is so high. The act of direct election of their rulers by their own hands corresponds to the ideology of national sovereignty. The election is a major way for the people to exercise their rights as sovereigns.¹ In particular, under representative democracy, it is crystal clear that the election is an important institutional vehicles of realizing democratic principles (Lee, 2017).

In this perspective, this paper tries to find out how voter turnout is influenced by socioeconomic factors such as education level, social activity participation, primary occupation, and income level in South Korea.

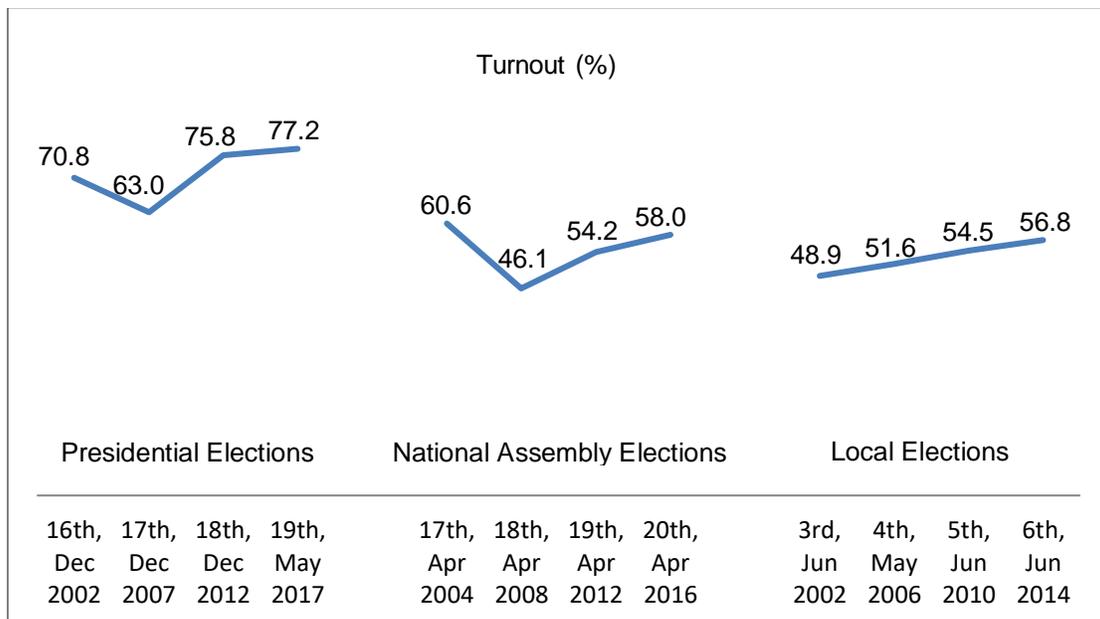
This paper also focuses on the presidential elections among the various elections held in South Korea. This is because the power of the president in South Korea overwhelms lawmakers or provincial governors, and consequently the turnouts of presidential elections are higher than others. Jackman (1987) argues that unicameralism rather than bicameralism fosters higher turnout due to concentration of power. He finds that voter turnout in countries, of which their legislative power is concentrated in one body, is significantly higher. The reason is that when the political power is commonly shared between the two chambers, then “elections for the lower house play a less decisive role in the production of legislation where bicameralism is strong” (Jackman, 1987, .408). Likewise, Blais (2006) suggests that turnout depends on the division of power between the president and the assembly, between the central government and the local

¹ Article 1 Clause 2 of Constitution of the Republic of Korea describes ‘The sovereignty of the Republic of Korea shall reside in the people, and all state authority shall emanate from the people.’

government. He concludes that “the more powerful the body that is being elected, the higher the turnout” (Blais, 2006, .114).

Descriptive statistics for voter turnout in the Republic of Korea demonstrate that the turnout of Presidential elections is substantially higher than National Assembly elections and local elections. Figure 1 shows turnouts by election type in the Republic of Korea since 2000. The average turnout of the four Presidential elections is 71.7 percent, which is much higher than the average turnout of the four National Assembly elections (54.7 percent) and the average turnout of four local elections (53.0 percent). In narrowing the period to 2010 and beyond, the difference becomes more apparent. The average turnout of the two Presidential elections is 76.5 percent, which exceeds 20 percent more than the average turnout of the two National Assembly elections (56.1 percent) and the average turnout of two local elections (55.7 percent). This is attributed to the unique political structure of separation of powers in which the president is given more powerful authority under the presidential system in the Republic of Korea.

Figure 1: Turnout by Election Type (%)



Data Source: National Election Commission of Republic of Korea

Literature Review

Why do people vote? In other words, which factors lead electorates to the polls on election days? In order to explain this, political scientists have adopted the Rational Choice Theory which argues that all action is essentially 'rational' and that people compute the expected costs and benefits of any action prior to deciding what to do (Scott, 2000). First of all, the expected benefits of voting can be recognized as the probability that a marginal voter might change the outcome of the election. In this case, according to economics logic, low turnout is anticipated because it is unlikely that any one person can change the election results in most national elections. Nevertheless, many people actually cast a ballot. This has been called the 'paradox of not voting' (Yun & Joo, 2010; Feddersen, 2004), and there have been lots of theoretical research and empirical studies to find out how to explain this.

Rational Choice Theory

Rational Choice Theory supposes that an electorate goes to the polls when the benefits from the outcome of voting exceed the costs of paying for taking part in a vote. The benefits mean the political asset or psychological satisfaction obtained by increasing the probability that the favored candidate is elected, and the costs mean the material and temporal opportunity cost to be paid by going to the polling place. Thus, the expected utility that an individual can obtain by voting is as follows.

$$R = BP - C$$

In the above formula, R means 'Reward,' which is the expected utility obtained through voting. B indicates the material and mental 'Benefit' that the voter gets when the favored candidate wins. P denotes the increased 'Probability' that the favored candidate is able to be elected by one vote. C is the material and temporal 'Cost' that the voter should pay when going to

the polls. Finally, according to the Rational Choice Theory, when the 'Reward' through voting is greater than zero ($R > 0$ or $BP - C > 0$), the voters head to the polling place.

At this point, the variable that should be scrutinized is P , which affects voters' marginal influence on the outcome. As the number of electorates in the constituency increases, P decreases and the value of BP also decreases. In other words, the expected utility of voting is less than the cost of voting. From this point of view, not to vote is more rational than to vote (Downs, 1957; Riker & Ordeshook, 1968; Aldrich, 1993; Feddersen, 2004; Jung, 2012).

Then, why are so many voters going to the polls in reality? Riker & Ordeshook (1968) introduce another variable (D) to the formula to explain the voting behavior as follows.

$$R = BP - C + D$$

In this equation, D is the 'Satisfaction' of the voting act itself to voters. In other words, regardless of the outcome of the election, the individual is able to take political satisfaction in voting itself. The satisfaction may arise from "compliance with the ethic of voting, affirming allegiance to the political system, affirming a partisan preference" (Riker & Ordeshook, 1968, .28). After all, given that the influence of an individual on the outcome of the vote is close to zero ($BP \approx 0$), voters will vote when they think that D is greater than C (Jung, 2012).

Turnout and Socioeconomic Factors

Socioeconomic status can be significant variables in explaining turnout. Individuals with a greater socioeconomic status are more likely to have time and resources to participate in policy process and politics. The proposition that the higher the socioeconomic status is, the higher the level of participation in politics is validated several times, although the degree of correlation with dependent variables is different in the context of various countries (Park, 2005). In other words, individual socioeconomic variables such as education level, participation in social activities,

primary occupation, and income level might affect both D related to the social sense of duty and C for casting a vote in the above turnout decision model (Jung, 2012).

First, the higher the level of education of the constituency has, the higher the turnout is. One of the purposes of education in modern democratic countries is to teach individuals a democratic way of life, in which students are continuously taught that voting is both the right and the duty of a democratic citizen (Kim & Song, 2014). Also, through the activities such as student club, individuals have a basis for future social activities, and these activities have the effect of strengthening the social sense of duty to vote as a citizen. In addition, education can lower the cost of getting information about candidates running for the election. Voters need information on how their policies fit their ideology and interests. If the voters' level of education is high, information accessibility to candidates through mass media or peer groups becomes easier and the information can be relatively easily interpreted (Downs, 1957).

Second, the higher the rate of the population with social affiliation in the electorate is, the higher the turnout is. Political parties can be considered as an organization closely related to political participation. Political parties initially aim for political purposes and to encourage and mobilize voters' support, particularly in the electoral arena (Huckfeldt & Sprague, 1992). On the other hand, cultural organizations, religious groups, and other volunteer organizations that seem to exist outside the political arena can rather provide their members with a political stimulus to participate more effectively than political parties to realize its political interests or policy agenda (Schlozman, 2002). Even if these non-political organizations do not perform political activities, the interpersonal relationships and the communication skills acquired by the members through their organizational activities can be demonstrated in the political sphere. Therefore, when discussing the relationship between civic involvement and political participation, it is important

to take into account not only political parties but also civil society organizations, unions, business associations, religious organizations, cultural organizations, alumni associations, and even sports organizations (Park, 2005).

Third, the higher the percentage of the population engaged in the primary industry in the electorate, the higher the turnout. One of the persistent phenomena in analyzing turnout in South Korea is that the turnout in the rural areas is much higher than in the cities. Some political scientists are looking for the structural characteristics of the rural community that still maintain community life as the cause of the high turnout of the farmers (Hwang, 2011). The social structure of the rural community itself raises the sense of duty to the farmers to vote as a member of the local community. This claim could be applied to all primary industry workers, such as fishermen or miners with similar community structures (Jung, 2012).

Last but not least, the higher the level of income of the constituency, the higher the turnout. The level of income is one of the important variables that define the socioeconomic status of individuals along with the level of education. According to the socioeconomic status model, an increase in the level of income might raise the probability of individuals' voting in terms of lowering the cost of voting and building social sense of duty. Blais & Dobrzynska (1998) suggest that improving income levels would enlarge the chances of obtaining information related to the ballot, thus lower the cost of voting. In addition, Jung (2012) claims that the lower the income level, the greater the burden of going to work at the polling day. Namely, irregular workers with low wages are more likely to work on election days, and are less able to adjust their work hours at their discretion. Moreover, the higher the income level, the greater the sense of duty to participate in voting and the one of political efficacy of voting (Yun & Joo, 2010).

Analysis Model & Data

This paper fundamentally introduces the Multiple Regression Analysis with OLS method in order to measure the influence of the socioeconomic background of constituencies on voter turnout. This paper takes the proportion of the population over higher education of constituencies (education level), the percentage of population participating in social activities (social activity participant), the ratio of primary industry workers (primary industry worker), and property tax per capita (income level) as explanatory variables. In order to control for demographic and regional impact, this paper also includes the percentage of the population over 65 (elderly population), the percentage of female population (female population), and municipal-level divisions (regional, dummy) as control variables in the model. Thus, the analysis model would be defined as below.

$$T_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + \varepsilon_i$$

Where, T_i denotes *ex post* voter turnout of election i , X_{1i} is education level of election i , X_{2i} is social activity participant, X_{3i} is primary industry worker, X_{4i} is income level, X_{5i} is elderly population, X_{6i} is female population, X_{7i} is regional dummy, and ε_i is an error term.

Dependent Variable: Turnout of 18th and 19th Presidential Election

The dependent variable is the turnout of 18th and 19th Presidential Election, which was held in December 2012 and May 2017 respectively, in the Republic of Korea by municipal-level divisions. This paper utilizes the outcome of presidential election because president has the most decisive political power in the Republic of Korea. In addition, by focusing on the turnout of same candidates regardless of municipal-level divisions, the impact of socioeconomic factors by

municipal-level divisions on the turnout could be more conspicuous. The data comes from the Republic of Korea National Election Commission, which issues the basic statistics of every election such as number of registered voters, number of ballots cast, number of valid votes by candidate, number of invalid ballots, and number of abstentions. In detail, the dependent variable is calculated by dividing the total number of ballots cast by the total number of registered voters in municipal-level divisions and multiplying by 100.

Explanatory Variables: Socioeconomic Status (4)

In order to examine the effect of socioeconomic factors on turnout, this paper selects 1) the proportion of the population over higher education (education level), 2) the percentage of population participating in social activities (social activity participant), 3) the ratio of primary industry workers (primary industry worker), and 4) property tax per capita (income level) as independent variables.

First, to estimate the influence of education level on turnout, the education level of the inhabitants of the constituency is measured as the proportion of the population that is either enrolled in or graduated from higher education such as universities, colleges, and technical colleges. Jung (2012) has introduced the education level as the proportion of the ‘graduation’ population over higher education. This, however, results in the exclusion of the vast majority of university students who have the right to vote. The figures, in this study, of the population over higher education is calculated by dividing the number of people, that are ‘enrolled’ or ‘graduated’ in higher education, in the municipality by the total number of registered voters and multiplying by 100.

Second, this paper uses the percentage of the population participating in social activities as a variable in order to investigate the force of social activity participant on turnout. The total

population participating in social activities is measured by adding the number of people 'registered' in the organizations such as social organizations, economic organizations, cultural organizations, political organizations, religious organizations, territorial societies, fellowship societies, and educational organizations, from the census of the Republic of Korea in 2010 and 2015, and then multiplying by 100.

Third, in order to explain the power of the occupation on turnout, this paper counts the population engaged in agriculture, forestry and fishery in municipality, divides this value by the total number of registered voters of districts, and then multiplies by 100.

Finally, in order to find the income level of the inhabitants of the constituency, this paper utilizes property tax per capita, which is computed by dividing the property tax collected in each municipality by the total number of registered voters. Since information on income level of municipal-level divisions such as GRDP (Gross Regional Domestic Product) is not disclosed in the Republic of Korea, property tax² is used as a substitute variable.

As noted in the previous theoretical discussion, with the influence of other variables under control, the proposed hypothesis is that an increase in the proportion of the population with a higher education, the percentage of the population participating in social activities, the ratio of primary industry workers, and property tax per capita will lead to an increase in turnout of municipal-level divisions.

² According to the Local Tax Act of the Republic of Korea, Objects of taxation of the property tax are land, buildings, housing, aircraft, and ships (Article 105; Objects of Taxation), the marginal tax rates are 0.2% ~ 0.5% of the tax base for land, 0.25% ~ 0.5% for buildings, and 0.1% ~ 0.4% for housing (Article 111; Tax Rates).

Control Variables: Demographic or Regional Factors (3)

The variables that indicate the demographic characteristics of the districts embody the percentage of population over 65 (elderly population) and the percentage of female population (female population). It is well known that the elderly population has a higher turnout rate than the younger generation, and most studies on voter turnout so far support this (Cox & Munger, 1989; Nevitte, Blais, Gidengil, & Nadeau, 2000). Some political scientist explains that the turnout of this elderly population is comparatively higher than the younger generations because the elderly population have a relatively high leisure time and the opportunity cost for voting is small (Jung, 2012). In addition, this paper includes the ratio of female population as a control variable in the analysis because the gender might induce the difference in turnout. The statistical data on above two demographic factors are based on the census of the Republic of Korea in 2010 and 2015.

In order to analyze the difference of turnout according to municipal-level divisions³ such as Gun (county), Si (city), and Gu (district), regional dummy variable is added to the analysis model. The higher the level of urbanization (Gu > Si > Gun), the more diversified interests and socio-economic strata are formed, which weaken the homogeneity of community members and dwindle the unity of community. Therefore, the turnout is expected to be low because of the decrease of social and psychological group pressure on political activities such as voting participation (Hwang, 2011).

³ The Republic of Korea is of 17 Provincial-level divisions (first-tier administrative divisions), and 229 municipal-level divisions (second-tier administrative divisions) in 2017. The municipal-level divisions are made up of 78 Si, 82 Gun, and 69 Gu. Normally, Si is one of the divisions of a province with more than 150,000 populations, whereas Gun is the other of the divisions of a province with less than 150,000 populations. For the most part, Gun is less densely populated, and more rural in character. Gu belong to the Special-City and the Metropolitan-City, and is similar to boroughs in New York City.

Findings

This paper considers municipal-level divisions as the unit of analysis, and uses multiple regression analysis to determine how the socioeconomic, demographic, and regional variables of each municipal-level division affect the turnout of the 2012 presidential election and the 2017 presidential election in the Republic of Korea. Basically, regression analysis allows the researcher to measure the direct impact of one independent variable on dependent variable when the effects of other independent variables are controlled, when he or she tries to examine the causal relationship between dependent variable and explanatory variables. Therefore, the influence of each variable on voter turnout through regression analysis could be analyzed, and subsequently the main factors related to the turnout of each municipality could be explained.

Each variable in the analysis model is measured based on data published on the Internet. Specifically, dependent variable is calculated based on the results of the 2012 and 2017 presidential elections provided by the Republic of Korea National Election Commission. Each independent variable is computed using the Census of 2010 and 2015 surveyed by the Statistics Korea, and the Local Tax Statistics Database (Search Year 2010 and 2015) of the Korea Institute of Local Finance. Given that the Census is conducted every five years, and the investigation is completed in November 2015, and the results are published in September 2016, the Census 2010 and 2015 results are the most recent available data before the presidential election.

Next, this paper reports the statistical characteristics of each variable and then explains the results of regression analysis.

Descriptive Statistics

Table 1 describes the socioeconomic and demographic characteristics of each municipality in relation to the presidential elections held in 2012.

Table 1. Basic Statistics of the Presidential Election in 2012

Variables	Obs	Mean	Std. Dev.	Min	Max
Dependent Variable					
Turnout (%)	230	75.56	2.57	66.63	81.57
Explanatory Variables					
Education Level (%)	230	32.04	13.55	8.07	69.22
Social Activity Participant (%)	230	40.91	6.03	27.13	63.06
Primary Industry Worker (%)	230	11.66	12.48	0.04	43.72
Property Tax Per Capita (₩1,000)	230	103.71	96.04	19.45	754.36
Control Variables					
Elderly Population (%)	230	19.00	8.85	6.47	38.84
Female Population (%)	230	50.62	1.59	43.58	54.52
Regional Dummy					
Gun (County); 1	83				
Si (City); 2	78				
Gu (District); 3	69				

There are 230 municipalities, which consist of 83 Gun (county), 78 Si (city), and 69 Gu (district). The mean of municipal is 75.56%⁴. The area with highest turnout is Gunwi-Gun in Gyeongsangbuk-Do at 81.57%, and the region with the lowest turnout is Ulleung-Gun in Gyeongsangbuk-Do at 66.63%. The differences of socioeconomic indicators such as education, occupation, per capita property tax, and the proportion of the elderly population between regional dummy are conspicuously observed. For example, Gangnam-Gu in Seoul Metropolitan City has 69.22% in terms of the proportion of the population with higher education, while Shinan-Gun in Jeollanam-Do has only 8.07%. In addition, Uiseong-Gun in Gyeongsangbuk-Do

⁴ This is an arithmetic mean of the turnouts by municipality unit, which is different from the official turnout (75.8%) provided by the National Election Commission, which is the ratio of total votes divided by total constituents.

has 43.72% of the population engaged in the primary industry, yet Gun such as Jung-Gu, Yongsan-Gu and Gangbuk-Gu in Seoul Metropolitan City has merely 0.04%. In case of property tax per capita, Jung-Gu and Gangnam-Gu in Seoul Metropolitan City shows the highest level of over 700,000 won (equivalent to about \$640), but 10 Guns (counties) including Yeongyang-Gun in Gyeongsangbuk-Do present below 30,000 won (equivalent to about \$27). When it comes to control variables, Goheung-Gun in Jeollanam-Do shows the highest percentage of the elderly population with 38.84%, while Dong-Gu in Ulsan Metropolitan City exhibits only 6.47%.

Table 2 describes the socioeconomic and demographic characteristics of each municipality in relation to the presidential elections held in 2017.

Table 2. Basic Statistics of the Presidential Election in 2017

Variables	Obs	Mean	Std. Dev.	Min	Max
Dependent Variable					
Turnout (%)	229	76.37	3.01	69.07	82.89
Explanatory Variables					
Education Level (%)	229	37.79	13.09	13.99	76.65
Social Activity Participant (%)	229	41.05	6.66	24.51	85.27
Primary Industry Worker (%)	229	10.38	11.36	0.04	39.91
Property Tax Per Capita (₩1,000)	229	184.81	160.24	39.04	1,407.99
Control Variables					
Elderly Population (%)	229	20.74	8.28	7.89	40.05
Female Population (%)	229	50.03	1.38	43.11	52.89
Regional Dummy					
Gun (County); 1	82				
Si (City); 2	78				
Gu (District); 3	69				

The observations are of 229 in terms of municipalities, which are consisted of 82 Gun (county), 78 Si (city), and 69 Gu (district). The number of Gun has dropped by one because Cheongwon-Gun was integrated into Cheongju-Si in July 2014. The mean of turnout of these 229 observations is 76.37%⁵. The area with highest turnout is Gwacheon-Si in Gyeonggi-Do as 82.89%, and the region with the lowest turnout is Dongducheon-Si in Gyeonggi-Do as 69.07%. The differences of socioeconomic indicators such as education, occupation, per capita property tax, and the proportion of the elderly population between regional dummy are conspicuously observed. For example, Gwacheon-Si in Gyeonggi-Do has 76.65% in terms of the proportion of the population over higher education, while Shinan-Gun in Jeollanam-Do has only 13.99%. In addition, Yeongyang-Gun in Gyeongsangbuk-Do has 39.91% of the population engaged in the primary industry, yet Gus such as Yongsan-Gu, Gwanak-Gu and Seongdong-Gu in Seoul Metropolitan City has less than 0.05%. In case of property tax per capita, Jung-Gu and Gangnam-Gu in Seoul Metropolitan City shows the highest level of over 1,100,000 won (equivalent to about \$1,000), but 10 Guns (counties), which are mainly distributed in Do (Province) area such as Jeollanam-Do, Gyeongsangbuk-Do, and Gangwon-Do, present below 50,000 won (equivalent to about \$45). When it comes to control variables, Gapyeong-Gun in Gyeonggi-Do shows the highest percentage of the elderly population with 40.05%, while Buk-Gu in Ulsan Metropolitan City exhibits only 7.89%.

The Results of Regression Analyses

This study uses multiple regression analysis to find out the factors affecting turnout in each municipality in the 2012 and 2017 presidential elections. Table 3 shows how dependent variable is affected by independent and control variables.

⁵ This is an arithmetic mean of the turnouts by municipality unit, which is different from the official turnout (77.2%) provided by the National Election Commission, which is the ratio of total votes divided by total constituents.

Table 3. The Results of Regression Analysis

	Dependent Variable: Turnout (%)	
	Election in 2012	Election in 2017
Explanatory Variables		
Education Level (%)	0.1713*** (0.0245)	0.1678*** (0.0330)
Social Activity Participant (%)	-0.0376 (0.0253)	0.0116 (0.0339)
Primary Industry Worker (%)	0.1549*** (0.0397)	0.2286*** (0.0417)
Property Tax Per Capita (₩1,000)	-0.0094*** (0.0015)	-0.0041*** (0.0011)
Control Variables		
Elderly Population (%)	-0.0542 (0.0641)	-0.2374*** (0.0583)
Female Population (%)	0.2740 (0.1406)	0.6059*** (0.1562)
Regional Dummy		
Si (City)	-0.5158 (0.5062)	-1.0530 (0.5777)
Gu (District)	-0.2126 (0.6632)	-0.0678 (0.7487)
Constant	58.1814*** (6.2737)	42.9337*** (7.1114)
Degree of Freedom	229	228
R-squared	0.3398	0.3824

Note: Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results are briefly summarized as follows. The turnout in the municipality is significantly related to socioeconomic characteristics such as the proportion of the population over higher education of constituencies (education level), the ratio of primary industry workers (primary industry worker), and property tax per capita (income level). However, the percentage of population participating in social activities (social activity participant) is insignificant. In addition, the demographic factors like the percentage of population over 65 (elderly population) and the percentage of female population (female population) show a significant relationship only in the 2017 election. In the following, the impact of each variable on the turnout will be explained in more detail by factors.

The Impact of Socioeconomic Factors on the Turnout

First, the level of education in municipalities in the 2012 and 2017 presidential elections increases voter turnout. As shown in Table 3 above, the coefficients of Education Level are 0.171 and 0.168 respectively, and these are both statistically significant with a significance level of 0.001. This demonstrates that holding the other variables constant, when the proportion of the population with higher education of the district increases by 1%, the turnout increases by 0.171% in 2012 and 0.168% in 2017. In other words, assuming that one particular district is 10% higher Education Level than the other, the turnout is about 1.7% higher on the condition that all other variables are the same. Based on the results of the analysis of this aggregated data, it can be inferred that individuals with a university admission or higher in a specific district are more likely to go to the polls on the day of election than those who have not matriculated at a university or college (Jung, 2012). This finding also supports the results of previous studies suggesting that the level of individual education has a positive effect on turnout.

Second, the impact related to the percentage of population participating in social activities of the district is not consistent and its statistical significance is weak. The percentage of population participating in social activities had a negative impact on turnout in 2012, whereas the one in 2017 shows a positive effect on turnout. However, both cases were not statistically significant because the probability values are 0.139 and 0.732 respectively. This study can consider the reason why social activity variables are not related to the turnout as a problem of variable measurement. The population census is conducted through face-to-face surveys or answering Internet questionnaires. Unlike other items, however, the subjectivity of the subjects is often involved in social activity participation rates. In cases of the education level and the ratio of the primary industry workers, the subject can clearly answer his or her situation. However, in the case of the social activity participation rate, there is a problem that he or she can not answer how enthusiastically he or she participates in the group activity. Furthermore, the most important issue is that the census by social activity is capable of multiple responses. In conclusion, these errors lead to the overestimation of variable.

Third, the ratio of primary industry workers in municipalities in the 2012 and 2017 presidential elections increases voter turnout. According to Table 3 above, the coefficients of Primary Industry Worker are 0.155 and 0.229 respectively, and these are both statistically significant with a significance level of 0.001. This explains that holding the other variables constant, when the ratio of primary industry workers of the district increases by 1%, the turnout increases by 0.155% in 2012 and 0.229% in 2017. In other words, assuming that one particular district is 10% higher Primary Industry Worker than the other, the turnout is about 1.6% or 2.3% higher on the condition that all other variables are the same. This analysis also supports the results of previous studies suggesting that the ratio of primary industry workers has a positive

effect on turnout. The structural features of the rural community, in which residents have high homogeneity and contact frequently with each other, make the network between individuals dense, thereby enhance community consciousness that emphasizes the political contribution to society, and make individuals receive strong pressure from the periphery to go to the polls (Jung, 2012; Abrams, Iversen, & Soskice, 2011; Gerber, Green, & Larimer, 2008).

Lastly, property tax per capita in municipalities in the 2012 and 2017 presidential elections decrease voter turnout. As shown in Table 3 above, the coefficients of Property Tax Per Capita are -0.009 and -0.004 respectively, and these are both statistically significant with a significance level of 0.001. This indicates that holding the other variables constant, when the property tax per capita of the district increases by 100,000 won (approximately \$100), the turnout decreases by 0.9% in 2012 and 0.4% in 2017. In other words, assuming that one particular district is 100,000 won higher Property Tax Per Capita than the other, the turnout is about 0.9% or 0.4% lower on the condition that all other variables are the same. This result counters the prevailing studies suggesting that the higher income level has a positive effect on turnout. Some political scientists argue that high-income citizens are consistently more likely to go to the polls than those in low income quintile. When a person suffers from economic hardship, his scarce resources are consumed not by remote interests like politics but by holding the body and mind together. Economic problems increase the opportunity cost of political participation and reduce the ability of people to attend politics (Nevitte, Blais, Gidengil, & Nadeau, 2000; Rosenstone, 1982).

However, this study attempts to point out Korea's unique political situation and income-age distribution in order to explain a negative correlation between income level and turnout, which is opposite to previous studies. South Korea remains the only divided country in the world

and remains in a state of truce for about 65 years without a peace treaty with North Korea. In this situation, the elderly who directly or indirectly experienced the Korea War and catastrophic consequences has been more likely to support the conservative party at every election, and this ideological voting tendency has overtaken the propensity of class voting according to the income level observed in the western countries. Kang (2013) presents a mixture of generations and classes in low-income brackets as one cause of class betrayal voting in South Korea. In the study conducted by the face-to-face interview method (n = 1,200) after the presidential election in 2012, the abstention rate in low-income brackets are lowest (Table 4). Then, 44.7% of the low-income brackets are the elderly people over 60s (Table 5), whereas the proportion of the elderly in the middle-income group or the high-income group is not so high (Kang, 2013). In conclusion, the high turnout of the elderly in the low income group triggers the inverse correlation between the income level and voter turnout.

Table 4. Turnout by Income Level in 2012 Presidential Election

	Park, Geun-Hye	Moon, Jae-In	Abstention	Total (n)
Low-income brackets	56.3	34.6	9.1	100.0 (396)
Middle-income brackets	46.1	40.9	13.0	100.0 (545)
High-income brackets	46.2	41.9	11.9	100.0 (236)
Average	49.5	39.0	11.5	100.0 (1177)

Source: Kang, W. T. (2013). "Class Betrayal Voting" in South Korean Elections. p. 11.

Table 5. Age Distribution of Income Level in 2012 Presidential Election

	19~29	30s	40s	50s	60s ~	Total (n)
Low-income brackets	11.9	12.9	13.9	16.6	44.7	100.0 (403)
Middle-income brackets	19.3	24.7	27.7	18.9	9.4	100.0 (555)
High-income brackets	25.2	23.1	23.1	23.1	5.5	100.0 (238)

Source: Kang, W. T. (2013). "Class Betrayal Voting" in South Korean Elections. p. 14.

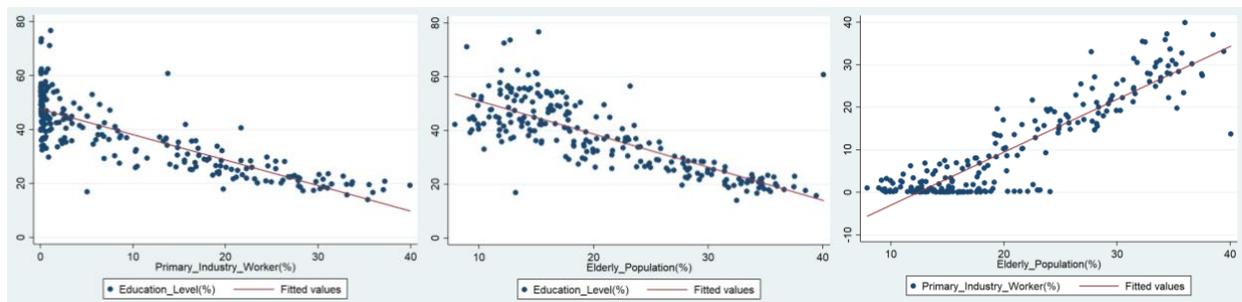
Limitations

The primary concerns in carrying out this study are the multicollinearities, which are the significant correlation between explanatory variables. For example, the correlation coefficients between education level, primary industry worker, and elderly population in the 2017 presidential election are more than 0.75 (Table 6). Figure 2 shows that the proportion of the population over higher education of districts (education level) has a negatively strong correlation with the ratio of primary industry workers (primary industry worker) and the percentage of population over 65 (elderly population), and the correlation between the ratio of primary industry workers (primary industry worker) and the percentage of population over 65 (elderly population) is extremely positive.

Table 6. The Correlation Coefficients between Variables (more than 0.75)

	Education Level	Primary Industry Worker	Elderly Population
Education Level	1.00		
Primary Industry Worker	-0.82	1.00	
Elderly Population	-0.78	0.90	1.00

Figure 2: The Correlation between Variables



Nevertheless, this study inevitably includes these variables in the regression model. This is because arbitrarily omitting certain variables due to the problem of multicollinearity can

exaggerate or undervalue the effects of other variables. In addition, the result of VIF (Variance Inflation Factor) after regression analysis shows that all variables are less than 10 (Table 7).

Therefore, this study is somewhat free from the problem of multicollinearity. Although this study deals with this problem very simply, future researches will develop more accurate data construction and regression model.

Table 7. The Result of VIF

Variables	VIF	1/VIF
Education Level	7.38	0.135574
Social Activity Participant	2.02	0.496062
Primary Industry Worker	8.83	0.113253
Property Tax Per Capita	1.31	0.765736
Elderly Population	9.18	0.108988
Female Population	1.82	0.549860
Group		
2	2.96	0.337672
3	4.66	0.214453
Mean VIF	4.77	

Conclusions

This study tries to find out the impact of socioeconomic factors on voter turnout. In particular, the determinants of the turnout in the 2012 and 2017 presidential elections in the Republic of Korea are analyzed by using the aggregated data in terms of municipal-level divisions. In short, this study has found facts that support previous researches. The education level and the percentage of primary industry workers in the district have had a statistically significant impact on turnout. When the influences of other variables are controlled, the higher the proportion of the population over higher education in the district, the higher the turnout rate. Likewise, the higher the ratio of primary industry workers in the region, the higher the turnout. However, the impact of the percentage of population participating in social activities in the district is not statistically significant because of relevance problem related to data collection.

The main feature of this study, which is opposite to the previous studies, is that income level is negatively associated with voter turnout when holding the other variables constant. When the influence of other variables is controlled, the higher the property tax per capita in municipality, the lower the turnout rate. This study attempts to point out Korea's unique political situation and income-age distribution to understand a negative correlation between income level and turnout. Specifically, in South Korea, the turnout of the low-income group is relatively higher than middle-income group and high-income group, and about 45% of the low-income group is consisted of the elderly people (Kang, 2013).

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Appendix A. The results of regression analysis (2012)

	Dependent Variable: Turnout (%)			
	Model 1	Model 2	Model 3	Model 4
Explanatory Variables				
Education Level (%)	0.1912*** (0.0208)	0.1879*** (0.0220)	0.1712*** (0.0242)	0.1713*** (0.0245)
Social Activity Participant (%)	-0.0459 (0.0252)	-0.0417 (0.0254)	-0.0399 (0.0252)	-0.0376 (0.0253)
Primary Industry Worker (%)	0.1648*** (0.0223)	0.1636*** (0.0249)	0.1560*** (0.0374)	0.1549*** (0.0397)
Property Tax Per Capita (₩1,000)	-0.0092*** (0.0016)	-0.0093*** (0.0015)	-0.0092*** (0.0015)	-0.0094*** (0.0015)
Control Variables				
Elderly Population (%)			-0.0408 (0.0631)	-0.0542 (0.0641)
Female Population (%)			0.2681* (0.1326)	0.2740 (0.1406)
Regional Dummy Si (City)		-0.3010 (0.4947)		-0.5158 (0.5062)
Gu (District)		0.2305 (0.6256)		-0.2126 (0.6632)
Constant	70.3467*** (1.1014)	70.3438*** (1.1445)	58.0538*** (5.9771)	58.1814*** (6.2737)
Degree of Freedom	229	229	229	229
R-squared	0.3215	0.3282	0.3349	0.3398

Note: Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix B. The results of regression analysis (2017)

	Dependent Variable: Turnout (%)			
	Model 1	Model 2	Model 3	Model 4
Explanatory Variables				
Education Level (%)	0.2520*** (0.0280)	0.2449*** (0.0296)	0.1775*** (0.0325)	0.1678*** (0.0330)
Social Activity Participant (%)	-0.0602 (0.0311)	-0.0547 (0.0319)	0.0020 (0.0337)	0.0116 (0.0339)
Primary Industry Worker (%)	0.1884*** (0.0316)	0.1852*** (0.0339)	0.2244*** (0.0389)	0.2286*** (0.0417)
Property Tax Per Capita (₩1,000)	-0.0038** (0.0011)	-0.0040** (0.0011)	-0.0038** (0.0011)	-0.0041*** (0.0011)
Control Variables				
Elderly Population (%)			-0.1932** (0.0568)	-0.2374*** (0.0583)
Female Population (%)			0.5796*** (0.1520)	0.6059*** (0.1562)
Regional Dummy Si (City)		-0.4376 (0.5828)		-1.0530 (0.5777)
Gu (District)		0.4152 (0.7382)		-0.0678 (0.7487)
Constant	68.0699*** (1.1995)	68.2070*** (1.2850)	42.9607*** (7.0090)	42.9337*** (7.1114)
Degree of Freedom	228	228	228	228
R-squared	0.3114	0.3236	0.3606	0.3824

Note: Standard errors in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001