The Effects of the Number of Voters on Voter Turnout in the Prewar General Elections in Japan Held by Restricted Suffrage*

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February 10, 2024

Abstract

While there are studies on elections in prewar Japan, only a few have analyzed the relationship between voter turnout and electoral district attributes, such as the number of voters. In contrast, this paper examines the effects of the number of voters and other factors on voter turnout in the first through the fifteenth House of Representatives elections. The results revealed that the number of voters is negatively correlated with voter turnout in the first through the fifteenth elections, as expected. Closeness is robustly positively correlated with it. The other factors included, such as the number of candidates and parties, are not robustly associated with it.

* This paper was prepared for the 27th annual meeting of the Japanese Public Choice Society and a meeting at Tohoku University. The former version of it was presented at the Modern and Contemporary Japanese Politics Research Forum. The authors thank Yukio Maeda, Kazunori Kawamura, Ryutaro Yoshida, and other participants for their helpful comments. The authors also thank Masaru Kohno, Matt Golder, Sona Golder, Yoshikuni Ono, Masaaki Higashijima, Gento Kato, Munenori Kita, Rui Asano, and Hironao Yoda for their kind comments. Any errors that remain are our own responsibility. This work was supported by JSPS KAKENHI Grant Numbers JP23H00777 and JP22K13341.

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1 Introduction

This paper analyzes the relationship between voter turnout and the number of voters and other factors in each electoral district in the prewar general elections in Japan held by restricted suffrage. During this period, suffrage was restricted based on the tax amount, and the number of voters in each electoral district differed significantly. Theoretically, in districts with a larger number of voters, turnout is expected to decline because it is expected that each vote is less likely to affect the outcome of the election; conversely, in districts with a smaller number of voters, turnout is expected to increase because it is expected that each vote is more likely to affect the outcome of the election. The results of the present paper support this theoretical prediction, showing that the number of voters is negatively correlated with voter turnout in the first through the fifteenth elections, as expected. The results suggest that even in prewar Japan, people rationally considered the value of their votes and cast their ballots. Closeness is robustly positively correlated with it. The other factors included, such as the number of candidates and parties, are not robustly associated with it. While many findings have been accumulated on the effects of electoral institutions on voter turnout both in Japan and abroad, almost all of such studies are limited to the postwar period, and this paper adds new findings to previous studies. In the following, section 2 overviews the elections in prewar Japan, especially focusing on turnout and the number of voters. Section 3 reviews previous literature and proposes hypotheses. Section 4 runs regression analyses to test the hypotheses. Section 5 interprets and relates the results with exsistent

research. Section 6 concludes.

2 The Elections in Prewar Japan

2.1 Overview of the Election Process

The suffrage of the House of Representatives elections held in prewar Japan was restricted by the tax amount, and from the first to the sixth elections (1889-1899), they were held by a single-seat district system. During this period, men had to be at least 25 years old to be registered as voters. They had to have paid the direct national tax of 15 yen (land tax and income tax) in the prefecture where he/she lived for at least one full year before creating the electoral roll (at least three years in the case of income tax). Single-name ballots were cast, but in two-member districts (43 out of 214 seats), two ballots were cast. Because of open ballots, it was possible to tell who had voted[1]. A multi-member district was adopted from the seventh to the thirteenth (1900-1918). During this period, suffrage was limited to citizens who paid 10 yen or more direct national taxes. Single and secret ballots were used during this period[2]. Furthermore, to increase the representation of commerce and industry in favor of the cities, about 30,000 voters in the cities could send one Diet member, which was significantly less than in the countryside (Inada 2018). In the fourteenth and fifteenth Diets (1919-1924), the system reverted to a

[1] Meiji 22 Law No. 3, https://dl.ndl.go.jp/pid/787976/1 (accessed: April 1, 2023).

[2] Meiji 33 Law No. 73, https://dl.ndl.go.jp/pid/788016/1 (accessed: April 1, 2023).

single-member district system. The restriction was loosened to 3 yen of direct national tax (see also Suetake 2009)[3].

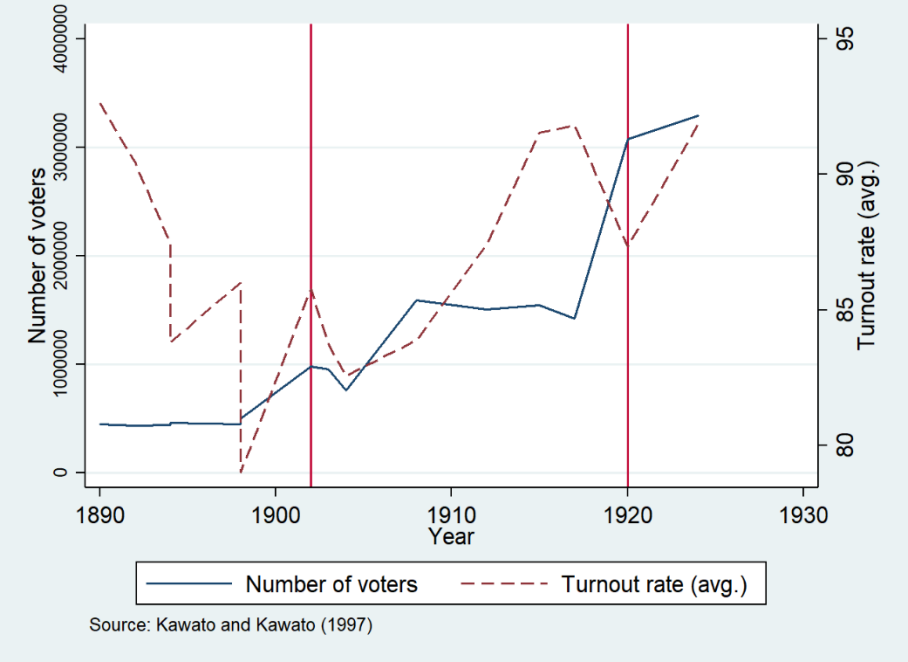

Figure 1: Number of voters and turnout rate from the first to the fifteenth election

Figure 1 looks at the changes in the number of voters and the yearly average voter turnout rate throughout the periods. Two red vertical lines indicate the timings of institutional reforms. The data were obtained from Kawato and Kawato (1990). The relationship between the two variables is not clear from the 1st to the 15th election.

[3] Taisho 8 Law No. 60, https://www.digital.archives.go.jp/DAS/meta/listPhoto?LANG=default&BID=F0000000000000025760&ID=&TYPE= (accessed: April 1, 2023).

2.2 District-Level Distribution of Turnout and the Number of Voters by Period

In the early elections held by restricted suffrage, the inequality of the number of voters among districts was very high (Annaka and Omata 2022). Figure 2 shows the distribution of the district-level number of voters per Diet member from the first to the sixth election. It shows a very large difference from district to district, ranging from near zero to around 5,000 voters[4] [5]. The smallest is 48, and the largest is 4702. The mean is 1541.97, with a standard deviation of 830.273. Next, Figure 3 shows the voter turnout per district from the first to the sixth election. Here, as in Figure 2, we can see that there are very large differences. The lowest is 27.7165%, and the highest is 100%. The average is very high at 86.55%. The standard deviation is 9.96%.

[4] It may be probable that the ratio of the most populous district to the least populous district is used as an indicator of inequality of the value of vote (Samuels and Snyder 2001; Kamahara et al. 2021). But in this study, we concentrate on the distribution of the number of voters, which is different from the ratio because the issue at stake is not necessarily the ratio itself but the density when all districts are considered in the regression analysis below.

[5] On the other hand, the division of districts was adjusted to elect one candidate per 120000 citizen as much as it could be.

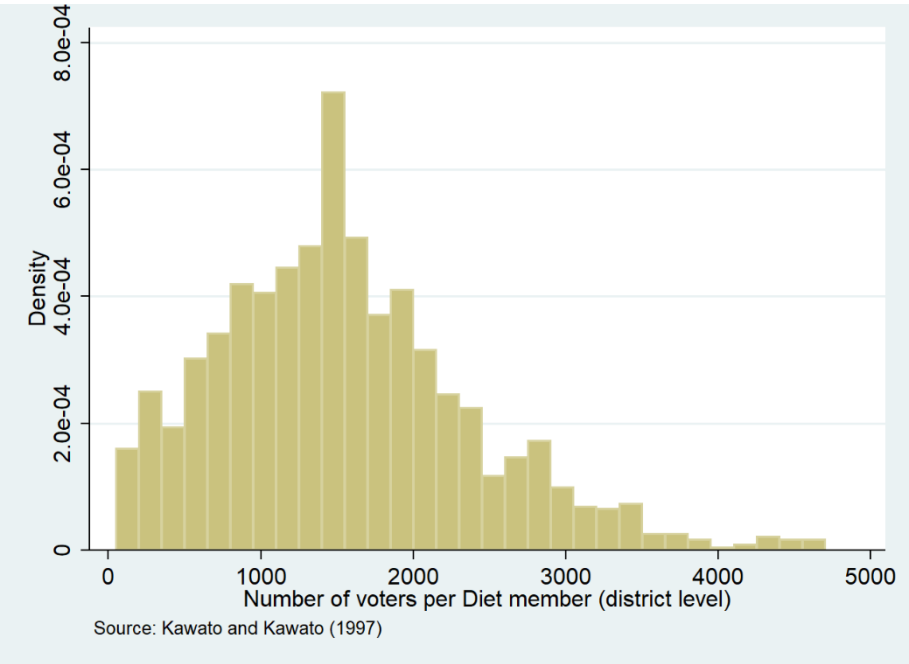

Figure 2: District-level number of voters per Diet member from the first to the sixth election

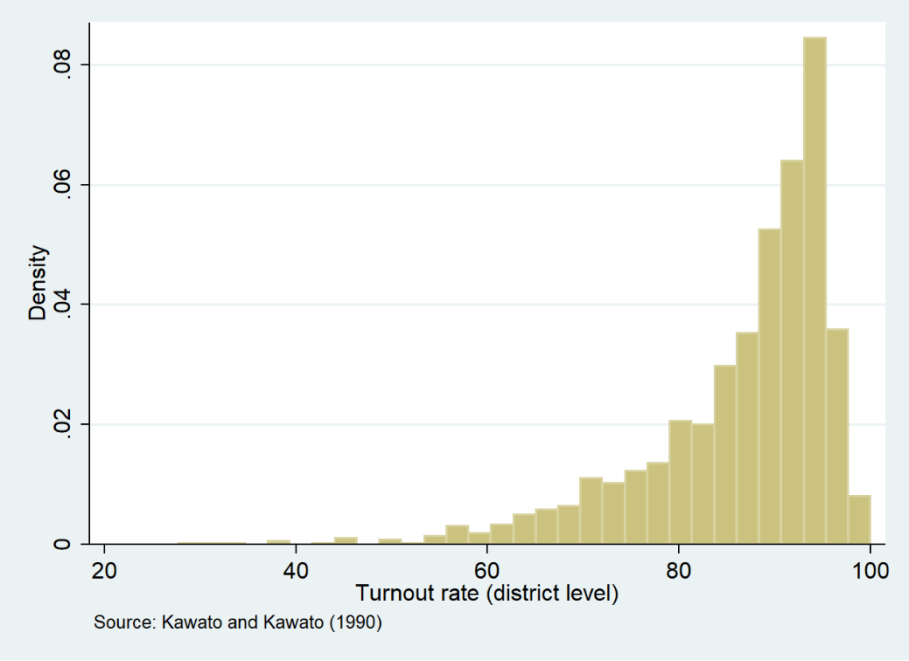

Figure 3: District-level voter turnout from the first to the sixth election

Figure 4 shows the distribution of voters per Diet member in districts from the seventh to the thirteenth election. This graph reveals that while some districts have more voters than the distribution from the first to the sixth election, the distribution tends to be skewed toward areas with smaller voters. This may be due to cities where there were fewer voters. The smallest is 162, and the largest is 8107.4. The mean is 2240.688, with a standard deviation of 1688.075. Figure 5 shows the distribution of voter turnout from the seventh to the thirteenth election. The minimum is 34.712%, and the maximum is 99.1096%. The mean is 86.7051%, with a standard deviation of 9.3152%.

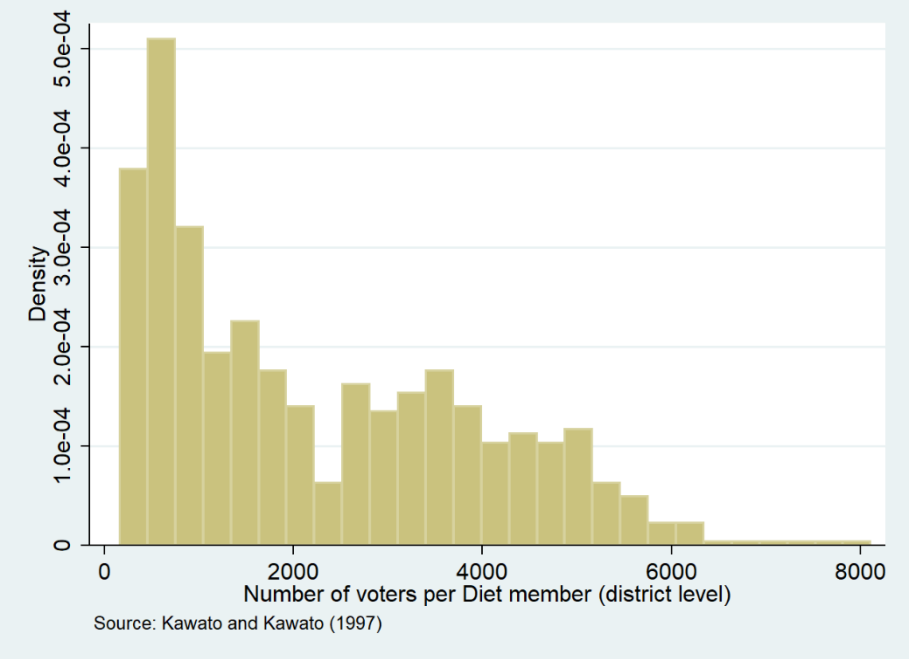

Figure 4: District-level number of voters per Diet member from the seventh to the thirteenth election

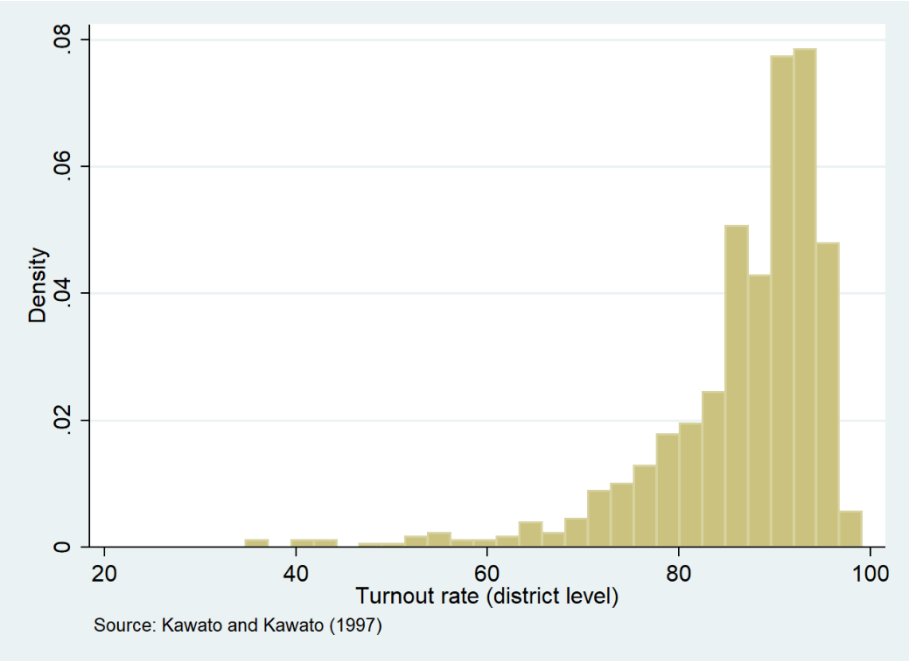

Figure 5: District-level voter turnout from the seventh to the thirteenth election

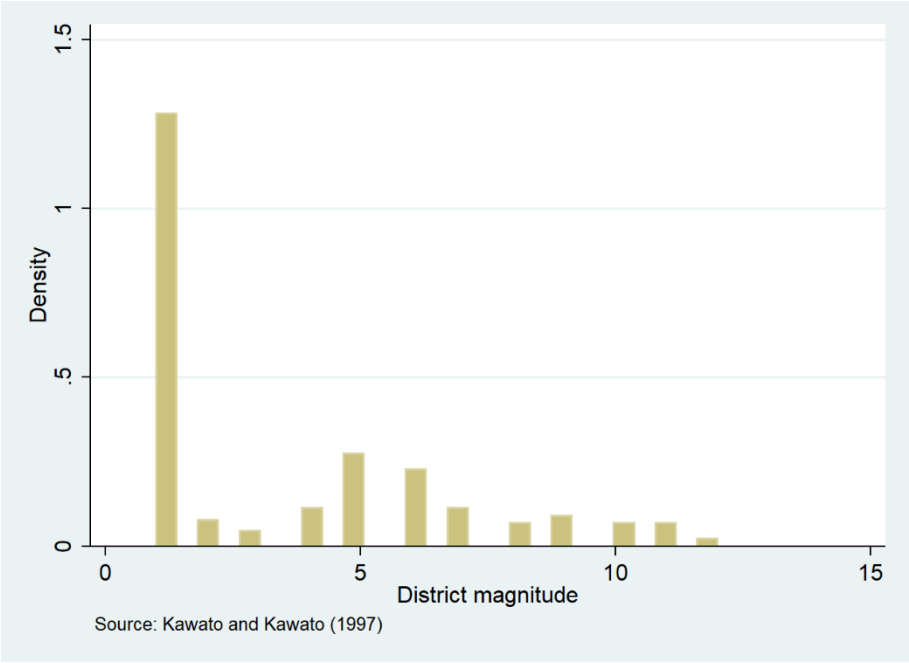

Figure 6: District magnitude from the seventh to the thirteenth election

Figure 6 indicates the variation of district magnitude in each district in a multi-member district system from the seventh to the thirteenth election. It shows that most of the districts are single-member (most of them are cities), but there is variation up to the largest 12.

Figure 7 shows the distribution of voters per Diet member in districts for the fourteenth and fifteenth elections. There is a trend toward a marked increase in the number of voters, influenced by the expansion of suffrage. The minimum is 867, and the maximum is 15927. The mean is 6941.037, with a standard deviation of 3017.301. Figure 8 reveals the variation of the turnout during this period. The minimum is 50%, and the maximum is 99.2227%. The mean is 89.5785%, with a standard deviation of 7.3291%.

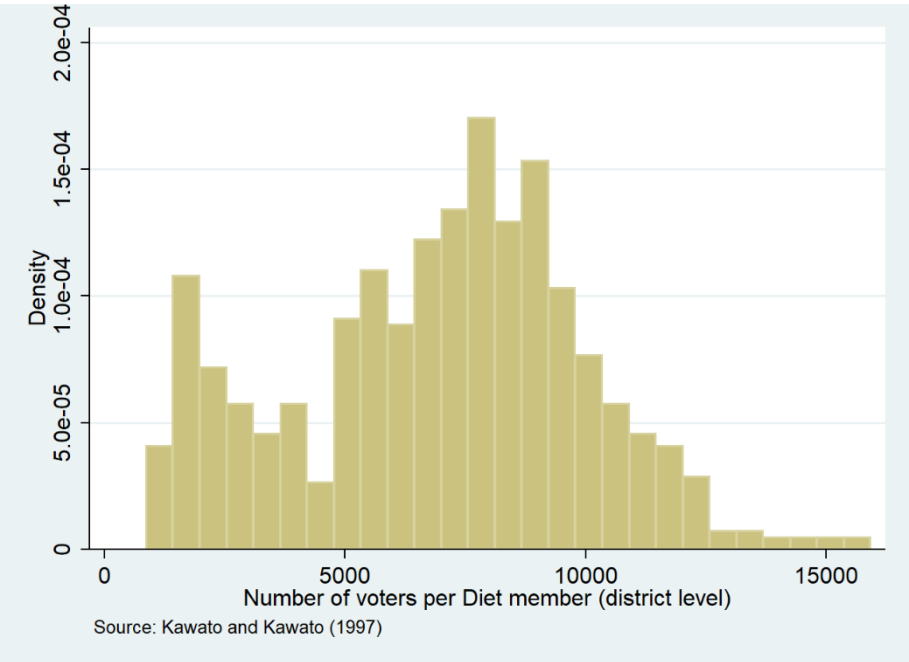

Figure 7: District-level number of voters per legislator from the fourteenth to the fifteenth election

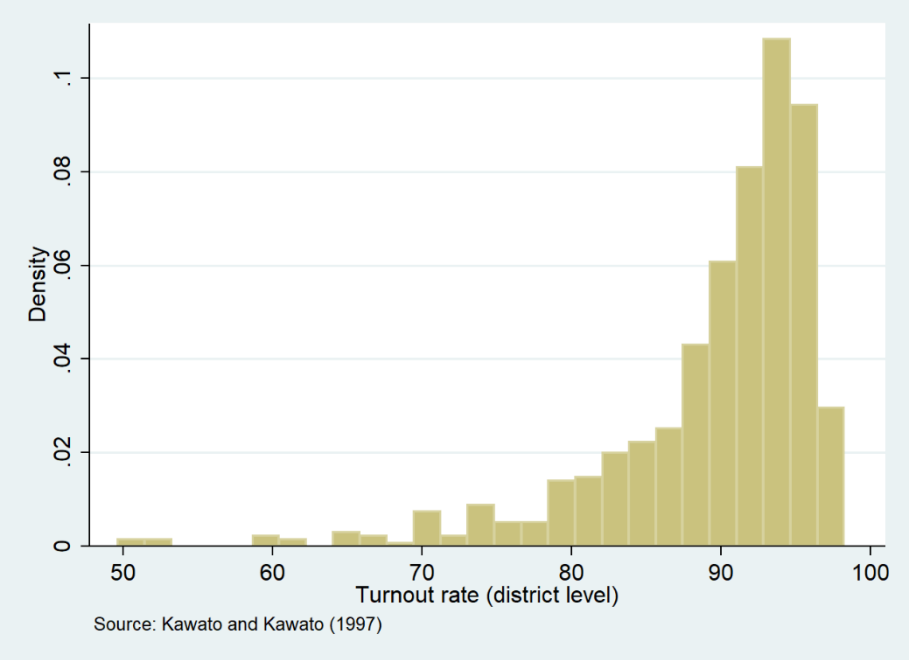

Figure 8: District-level voter turnout from the fourteenth to the fifteenth election

The early elections in prewar Japan can be overviewed as described above. In the following, we will theoretically examine the relationship between voter turnout, the number of voters, and other factors based on previous studies.

3 Previous Research and Hypothesis

3.1 Meta-Analysis of Determinants of Turnout

There has been a tremendous amount of literature on the determinants of voter turnout. However, almost all related research has reported mixed results on the effects of the factors except for

compulsory voting on turnout. Frank and Martínez i Coma (2023: 607) describe this as "If we ask what the most statistically significant and substantively important predictors of national-level voter turnout in democratic elections are, even after more than 50 years of comparative voter turnout research, there are few certainties beyond the fact that compulsory voting increases turnout".

There have been literature reviews (Blais: 2006; Cox: 2015; Smith: 2018) and meta-analyses (Geys: 2006; Smets and van Ham: 2013; Cancela and Geys: 2016; Stockemer: 2017) to address this problem. Geys (2006) collects 83 aggregate-level research on turnout from 1968 to 2004 and reveals that population size and stability, electoral closeness, campaign expenditures, and institutional procedures are robustly associated with turnout. Cancela and Geys (2016) expand on Geys (2006) by adding 102 more articles published between 2002 and 2015, differentiating results of national and subnational elections, and report that campaign expenditures, closeness, and registration requirements are consistently associated with turnout in national-level elections, while population size and composition, concurrent elections, and the electoral system are robustly correlated with turnout in subnational-level elections. On the other hand, Smets and van Ham (2013) review the findings of 90 individual-level research on voter turnout from 2000 to 2010 and find that age, education, residential mobility, region, media exposure, mobilization, voting in the previous election, party identification, political interest and knowledge have a consistent effect on voter turnout. Stockemer (2017) assesses 130 aggregate-(national, regional, and local) level research from 2004 to 2013 and reports that

compulsory voting, decisive election, and population size are correlated with turnout. In addition to these studies, Frank and Martínez I Coma (2023) utilize extreme bounds analysis instead of meta-analysis, criticizing meta-analysis for sensitivity to model specifications, and analyze 44 articles from 1986 to 2017. The study reports that nine variables are robustly correlated with voter turnout: compulsory voting, competitive elections, concurrent elections, economic globalization, proportional representation, spending decentralization, and some geographical dummy variables.

In summary, there are few certainties in previous studies, as Frank and Martínez i Coma (2023) suggest. Next, we will review the research focusing on district magnitude and the number of voters as determinants of voter turnout.

3.2 Research Focusing on District Magnitude and the Number of Voters

Besides such meta-analysis, there have been many studies on the determinants of voter turnout. Stockemer (2015), in a study of 110 countries between 1970 and 2012, shows a positive correlation between district magnitude and voter turnout in developed countries but no such relationship in developing countries.

As Smith (2018) suggests, a growing number of articles explore the determinants of turnout at the sub-national level. Jacobs and Spierings (2010) find that district magnitude negatively correlated with voter turnout in the Dominican Republic due to clientelism in constituencies with small district

magnitude. Mori (2015) reports that the population in each constituency is negatively correlated with voter turnout in India.

Alongside this line of research, some studies utilize historical data, as the present article does. Cox et al. (2016) examine the effects of proportional representation on voter turnout through the contraction in the distribution of mobilization effort before and after the 1919 electoral reform in Norway and report that the switch from a single-member district system to proportional representation in multimember districts led to a contraction in the distribution of mobilization effect and then a contraction in that of turnout rates. Fiva and Smith (2017) explore the mobilization effect on turnout in Norway's historical two-round system and conclude that when a candidate with local ties withdraws from the second-round election, the turnout significantly drops. Amat et al. (2020) utilize unique historical data in Barcelona in the 1930s to consider the mobilization effects and find that direct mobilization by political parties and social organizations and indirect mobilization by social networks affect voter turnout. However, the number of existing literature utilizing historical data on elections and statistical techniques is still limited.

3.3 Research on Turnout of the Elections in Prewar Japan

Nagayama (1997) analyzes district population and voter turnout in elections held by restricted suffrage. The study quantitatively shows extreme district-level voter disparity in this era, as the present paper

also shows above. It also analyzes the relationship between the number of voters and voter turnout, exploring the impact of new suffrage voters on voter turnout. The paper then concludes that almost no impact is recognized. Shimizu (2013), focusing on the first House of Representatives election, presents the population per Diet member and the number of voters based on Suematsu Kencho's "Twenty-Three Year General Election" (1890). Inada (2018), also targeting the first House of Representatives election, points out the existence of "property making," in which supporters at the time paid taxes for candidates to run elections, while also pointing out the high value of a vote in urban and mountainous areas that can select Diet members with relatively fewer voters, rather than rural areas with more voters in an election. Annaka and Omata (2022), looking at the first to sixth election, consider that the number of voters represents the average level of wealth in each district under the elections held by restricted suffrage and find that in the districts with a large number of voters where the wealthy are considered to live, more “Heimin,” commoners, were likely to be elected. Conversely, in the districts with few voters where the relatively poor are considered to live, more “Shizoku,” warrior class, were likely to be elected more often. Tamai (2006) examines the impact of the introduction of universal suffrage on voter turnout and also refers to trends before the introduction of universal suffrage. However, it is fair to say that no study has systematically analyzed the relationship between the number of voters and candidates and voter turnout under elections held by restricted suffrage in prewar Japan. Such analyses have been conducted in postwar Japan.

3.4 **Research on Turnout of the Elections in Postwar Japan**

Kohno (1999) analyzes the effects of the number of candidates and district magnitude on voter turnout in Tokyo assembly elections in Japan. The sutdy confirms that both the number of voters and the size of the district magnitude positively correlate with voter turnout. Horiuchi (2005) argues that the higher voter turnout in local council elections compared to lower house elections is partly due to the higher number of council members per capita in local council elections in Japan. Muraoka and Barcelo (2019) report that a bigger district magnitude leads to a decline in voter turnout in the Japanese multimember district system (single non-transferable vote; SNTV). Fujimura (2020) argues that malappointment leads to higher voter turnout because voters request that inequality in the value of one vote should be corrected and finds, using Japan's upper house election data, that district-level population size is positively associated with turnout. Wakamatsu (2020) analyzes prefectural assembly elections in Japan and finds that district magnitude negatively correlates with voter turnout and a nonlinear inverse U-shaped relationship between them. Shigemura (2021), using a survey experiment, suggests that a larger number of candidates may lead to more difficulty in identifying candidates and, hence, lower voter turnout. Matsubayashi (2023) reveals that the number of seats in Diet per 1 million voters is positively correlated with turnout. The article also points out that the electoral reforms in Japan in the 1990s, which reduced the number of seats, equalized the value of one vote, and led to minimizing the difference in voter turnout between urban and rural areas.

Theoretically, applying Downs' (1957)'calculus-of-voting' model and Riker and Ordeshook (1968), as Matsubayashi (2023) explains, the fewer the number of voters in each district, the higher the value of a vote and, thus, the higher the voter turnout[6]. Also, if the number of voters is the same, a bigger district magnitude would result in fewer voters per Diet member, leading to higher voter turnout. As Shachar and Nalebuff (1999) suggest, parties concentrate on distributing resources to districts whose elections are close matches and whose population is small. The tiny number of voters is most characteristic of elections held by restricted suffrage. We expect its effects to be much more easily found in elections during that time than now. We hypothesize this theoretical expectation as follows.

Hypothesis 1: The greater the number of voters in a district, the lower the voter turnout.

On the other hand, concerning the impacts of other factors, such as district magnitude and the number of candidates and parties, previous studies are divided both theoretically and empirically. Voters find their favorite candidate easily if many run. This would lead to higher voter turnout. However, it is also possible that voters cannot easily choose one of the candidates if too many candidates run and voters do not vote. Then, we deduce a prediction from this reasoning.

[6] Fujimura (2020) is almost only an exception, arguing that the opposite is expected.

Hypothesis 2: The effect of the number of voters on turnout can be more robustly found than the number of candidates and parties.

Below is a quantitative analysis that tests these hypotheses.

4 Statistical Analysis

4.1 Estimation Strategy

The estimation model to test the hypotheses above is as follows. The analysis is conducted by ordinary least squares (OLS), applying a first-difference approach (Cox et al. 2016; Fiva and Smith 2017; Matsubayashi 2023)[7].

$$\triangle \boldsymbol{Turnout_{it}} = \boldsymbol{a} + \boldsymbol{\beta_1} \triangle \boldsymbol{Voters_{it}} + \boldsymbol{\beta_2} \triangle \boldsymbol{Candidates_{it}} + \boldsymbol{\beta_3} \triangle \boldsymbol{Parties_{it}} + \boldsymbol{\beta_4} \triangle \boldsymbol{Closeness_{it}} + \boldsymbol{\gamma_t} + \boldsymbol{\varepsilon_{it}}$$

Turnout means voter turnout, which is the proportion of the number of cast votes to the total number of voters. *Voters* indicates the number of voters, and *Candidates* does the number of candidates[8]. *Parties* indicates the number of parties (Cox et al. 2016). *Closeness* means the percentage

[7] In the present study, we do not apply district fixed effect models because our primary interest variable is suspected of having a strong association with district characteristics, and this may lead to a serious multicollinearity problem.

[8] It should be noted, however, that the exact number of candidates cannot be determined because, at least in the early Diets, the candidacy system was not adopted, and from the firstst to the sixth Diets,

of the vote gotten by the winner minus that of the vote garnered by the runner-up (Wakamatsu 2020)[9]. γ imdicates election fixed effect. ε is the error term. i denotes electoral district, and t means election time. This analysis takes into account the problem of omitted variables with panel data, utilizing the first difference of variables and including election fixed effects. $\triangle$ is the first difference operator. The base categories for the election fixed effects are the first, seventh, and fourteenth elections respectively. Standard errors are clustered by electoral district. All variables are obtained from Kawato and Kawato (1997)[10]. Analyses are separated into three periods because the two institutional reforms divided districts differently, and accordingly, the unit of analysis has to be changed. Table 1 shows the summary statistics.

the concept of candidacy did not even exist (Inada 2018).

[9] This use of ex post measurement is contested. Ex ante measurement may be more appropriate to predict the outcome (Geys 2006) but we cannot obtain ex ante closeness data in such old days.

[10] The data do not explicitly mention their source. We refer to another source such as Seisen Kirokushi Kankokai (ed.) (1930) to find a few differences between the sources. But the differences are so few, and we do not change the data from Kawato and Kawato (1997)

Table 1: Summary statistics

Variables	Obs	Mean	Std.Dev.	Min	Max
election 1-6					
Turnout rate	1,542	86.5559	9.9662	27.7165	100
Number of voters	1,542	1777.186	1041.491	48	6154
Number of voters per Diet member	1,542	1541.97	830.273	48	4702
Number of candidates	1,542	3.5901	1.2367	1	13
Number of parties	1,542	1.6375	0.6847	0	5
Closeness	1,542	0.5357	0.3446	0	1.0197
election 7-13					
Turnout rate	753	86.7051	9.3152	34.712	99.1096
Number of voters	753	11644.18	14365.5	162	66935
Number of voters per Diet member	753	2240.688	1688.075	162	8107.4
Number of candidates	753	5.5737	4.5424	1	27
Number of parties	753	1.9004	0.9617	0	5
Closeness	753	0.7098	0.3052	0	1
election 14-15					
Turnout rate	748	89.5785	7.3291	50	98.2227
Number of voters	748	8507.439	4473.642	867	34771
Number of voters per Diet member	748	6941.037	3017.301	867	15927
Number of candidates	748	3.3529	0.9363	1	8
Number of parties	748	1.7660	0.6767	0	4
Closeness	748	0.6571	0.3033	0	0.9992

4.2 Results

Table 2 shows the results from the first to the sixth election. Model 1 is without controls. The number of voters is negatively correlated with voter turnout and is statistically significant. Model 2 replaces the number of voters with that per Diet member. The result does not change significantly. Model 3 includes all controls. Even after considering controls, the number of voters is still significant as

expected. Closeness is positively associated with turnout and is statistically significant; the other variables are insignificant. Model 4 again replaces the number of voters with the per Diet member. The result remains unchanged.

The effect sizes of voters per Diet member can be interpreted from each model. Although the coefficient appears very small, Model 4 predicts that an increase of 100 voters per Diet member would decrease voter turnout by about 0.68 percentage points, and an increase of 1,000 voters would decrease it by 6.8 percentage points. Considering that the average number of voters per Diet member from the first to the sixth elections is about 1,500, with a standard deviation of about 800, the effect would not be small.

Table 3 analyzes the seventh to the thirteenth election. The results in the models in this table are similar to those in Table 2. However, in Models 7 and 8, the number of candidates and parties positively correlated with turnout and is statistically significant at the 10% level. Closeness is positively associated with turnout and is statistically significant again.

Table 2: Results (election 1-6)

VARIABLES	(1) △Turnout	(2) △Turnout	(3) △Turnout	(4) △Turnout
△Number of voters	-0.00701***		-0.00532**	
	(0.00206)		(0.00212)	
△Number of voters per Diet member		-0.00850***		-0.00676***
		(0.00249)		(0.00251)
△Number of candidates			-0.290	-0.280
			(0.198)	(0.200)
△Number of parties			0.303	0.343
			(0.253)	(0.251)
△Closeness			9.639***	9.625***
			(0.681)	(0.681)
Constant	-2.642***	-2.650***	-2.625***	-2.639***
	(0.330)	(0.328)	(0.377)	(0.376)
Election fixed effects	Y	Y	Y	Y
Observations	1,285	1,285	1,285	1,285
Adjusted R-squared	0.146	0.148	0.385	0.387
Number of districts	257	257	257	257

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

An increase of 100 voters would decrease voter turnout by about 0.17 percentage points from Model 8, and an increase of 1,000 voters would decrease it by 1.7 percentage points. The number of voters slightly increased during the 7th through 13th election, with the average number of voters per Diet member increasing to over 2,000, with a standard deviation of about 1,500. Considering this, the effect can be said to be relatively large.

Table 3: Results (election 7-13)

	(5)	(6)	(7)	(8)
VARIABLES	△Turnout	△Turnout	△Turnout	△Turnout
△Number of voters	-0.000317***		-0.000177***	
	(9.06e-05)		(6.74e-05)	
△Number of voters per Diet member		-0.00308***		-0.00170***
		(0.000771)		(0.000569)
△Number of candidates			0.243*	0.229*
			(0.134)	(0.135)
△Number of parties			0.637*	0.634*
			(0.328)	(0.334)
△Closeness			14.00***	13.94***
			(1.424)	(1.426)
Constant	-2.101***	-2.159***	-1.241*	-1.295*
	(0.753)	(0.753)	(0.679)	(0.682)
Election fixed effects	Y	Y	Y	Y
Observations	644	644	644	644
Adjusted R-squared	0.075	0.082	0.400	0.402
Number of districts	109	109	109	109

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4 shows the results from the fourteenth and fiftheenth elections. Again the results in the models in this table are similar to those in Tables 3. In Model 12, the number of parties is not statistically significant. This is slightly different from the result in Model 8 in Table 3. Closeness is positively associated with turnout and is statistically significant again.

Table 4: Results (election 14-15)

VARIABLES	(9) △Turnout	(10) △Turnout	(11) △Turnout	(12) △Turnout
△Number of voters	-0.000846***		-0.000667***	
	(0.000274)		(0.000226)	
△Number of voters per Diet member		-0.00206***		-0.00160***
		(0.000488)		(0.000354)
△Number of candidates			1.349***	1.409***
			(0.386)	(0.382)
△Number of parties			0.803*	0.664
			(0.443)	(0.433)
△Closeness			13.51***	13.43***
			(0.959)	(0.948)
Constant	4.982***	5.377***	2.882***	3.196***
	(0.487)	(0.532)	(0.335)	(0.361)
Election fixed effects	Y	Y	Y	Y
Observations	374	374	374	374
Adjusted R-squared	0.018	0.031	0.550	0.558
Number of districts	374	374	374	374

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

An increase of 100 voters would decrease voter turnout by about 0.16 percentage points from Model 12, and an increase of 1,000 voters would decrease it by 1.6 percentage points. The number of voters more than doubled during this period, with the average number of voters per Diet member increasing to about 7000, with a standard deviation of about 3000. Considering this, the effect can be said to be reasonably large again.

The number of voters is robustly negatively associated with voter turnout throughout the first to fifteenth election as expected. This result suggests that the small number of voters under restricted

suffrage might rationally understand the value of their votes. The results support Horiuchi (2005) and Matsubayashi (2023) even in prewar Japan.

5 Conclusion

This paper analyzed the effects of the number of voters and other factors on voter turnout in the elections in prewar Japan. While there are quite a few studies on elections in prewar Japan, only a few have analyzed the relationship between the attributes of electoral districts, such as the number of voters and voter turnout. In contrast, this paper explored the impact of the number of voters and the other determinants of voter turnout in the first through the fifteenth general elections. The results revealed that the number of voters is negatively correlated with voter turnout as expected from the first to fifteenth election in the elections held by restricted suffrage. These results may imply that the voters rationally cast their votes even in prewar Japan. The effects of the other variables except for closeness vary depending on the periods. This study brings new insights to previous research in that it reports empirical results based on a new analysis of a subject that has not been examined with quantitative analysis before.

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