

Supplementary Materials for “What Determines
Preferences for an Electoral System? Evidence from a
Binding Referendum”

October 8, 2019

A Robustness checks

This section presents all robustness checks referring to samples and results mentioned in the main text. Table I provides descriptive statistics for the polling station main dataset. This is a replication of Table 2 including Māori polling stations and polling stations for “special votes”. Table II provides the 1996 Census descriptive statistics at the Area Unit level. Table III is a replication of Table 3 in the main text using all electorates (i.e. General and Māori electorates). Columns (1) – (4) in Table IV are a replication of Table 3 in the main text, with clusters at the Area Unit level. Columns (5) – (8) in Table IV are a replication of Table III in this Supplementary Materials, now with clusters at the Area Unit level. Table V extends Table 4 in the main manuscript to including *all* polling stations (i.e., General Roll, Māori Roll and “special votes”). In particular, given the inclusion of “special votes” polling stations, we cannot include sociodemographic controls. Table VI replicates Table 4 in the paper with clusters at the Area Unit level. Finally, Table VII presents the descriptive statistics for the 1993 survey of the New Zealand Election Study.

Table I: Summary statistics by polling station. All polling stations included (General Roll and Māori Roll).

	Mean	St. Dev.	Min	Max
Panel A: all polling stations, $N = 4273$				
# Referendum votes	448.8	475.9	0	7624
% Votes for MMP	52.14%	13.48	2.29%	97.8%
# (REF. – GE) votes	-1.15	8.61	-188	106
# Gral. Election votes	450	477	0	7796
% National	36.75%	20.12%	0%	96.1%
% Labour	33.58%	17.54%	0%	95.45%
% Alliance	17.48%	9.09%	0%	71.57%
Panel B: all standard polling stations (sample used in the remainder), $N = 3778$				
# Referendum votes	443.89	441.6	0	3094
% Votes for MMP	52.37%	13.47%	2.30%	97.78%
# (REF. – GE) votes	-0.08	3.69	-24	106
# Gral. Election votes	443.98	441.6	0	3097
% National	36.47%	20.8%	0%	96.07%
% Labour	33.59%	18.0%	0%	95.45%
% Alliance	17.72%	9.2%	0%	71.57%

[†]: Panel B excludes hospital votes, special votes in district before polling day, special votes on polling day, overseas special votes including service personnel votes and ordinary votes in district before polling day. # (REF. – GE) votes = Votes in Referendum – Votes in General Election.

Table II: Summary Statistics by Area Unit, 1996 Census

	Mean	St. Dev.	Min	Max
Population	1,884	1,455	0	7,824
Area (in km^2)	163.2	547	0.0423	7316
Mean MB area (in km^2) [‡]	0.008	0.040	0.00001	0.614
% Women	49.2	7.01	0	100
% ≤ 24 years old	34.7	9.50	0	86.0
% ≥ 65 years old	10.2	6.04	0	43.4
% Born in NZ	78.8	14.21	0	100
% White/Caucasian	81.1	20.39	0	100
% Māori	15.3	15.12	0	96.9
% Māori in Māori Roll	46.1	19.31	0	100
% Univ. Degree	7.0	6.38	0	44.5
% NZ\$ 20,000 or less	59.4	10.44	0	100
Median income in NZ\$(000)	40.3	12.39	17.5	100
% Receives <i>some</i> benefit	28.4	9.68	0	68.6
% Full time employed	34.0	7.89	0	77.4
% Earns rents or dividends	16.6	5.46	0	32.92
Observations		1,920		

[‡]: Mean MB area: mean meshblock area within Area Unit

Table III: Support for MMP at the Polling Station. Replication of Table 3 in the main text using all electorates (i.e. General and Māori electorates).

	(1)	(2)	(3)	(4)
Mean MB Area within AU	-119.9** (48.44)	-99.51** (42.00)	-101.5** (43.87)	-45.70** (22.12)
Pop. Density	1.306*** (0.394)	0.893** (0.390)	0.692* (0.400)	-0.243 (0.355)
% Women	0.404** (0.183)	0.265 (0.175)	0.454** (0.180)	0.152 (0.123)
% Born in NZ	-0.269*** (0.0528)	-0.239*** (0.0515)	-0.249*** (0.0517)	-0.153*** (0.0442)
% Māori	0.121*** (0.0444)	0.0267 (0.0454)	0.0595 (0.0480)	0.151*** (0.0373)
% > 64 y.o.	-0.112 (0.0901)	-0.278*** (0.101)	-0.210* (0.108)	-0.0477 (0.0786)
% < 25 y.o.	-0.154 (0.0946)	-0.117 (0.0971)	-0.113 (0.101)	0.00725 (0.0684)
% College degree	0.392*** (0.0629)	0.329*** (0.0683)	0.331*** (0.0769)	0.315*** (0.0743)
% < NZD 20,000	-0.0614 (0.0672)	-0.297*** (0.0899)	-0.225** (0.106)	-0.00971 (0.0855)
Median income in \$(000)	-0.382*** (0.0497)	-0.313*** (0.0606)	-0.292*** (0.0605)	-0.155*** (0.0372)
% Māori in Māori Roll (as in 1998)			-0.0235 (0.0205)	-0.0183 (0.0162)
% earns rents or dividends			-0.110 (0.158)	0.355*** (0.122)
% receives <i>some</i> benefit		0.455*** (0.109)	0.457*** (0.131)	0.0426 (0.105)
% full employment			0.183 (0.124)	0.203* (0.109)
Māori electorate (dummy)	9.361*** (1.462)	9.401*** (1.401)	9.500*** (1.296)	-4.913*** (1.305)
Party controls	NO	NO	NO	YES
R ²	0.332	0.350	0.362	0.660
Observations	3,617	3,617	3,449	3,334

*** Significant at 1% level; ** at 5% level; * at 10% level.

Dependent variable: Percentage of votes for MMP at the Polling Station. All variables refer to *Area Unit* level data. Population density: (People per km^2)/1,000. Party controls: share of votes for Labour, for National, and for Alliance. Standard errors clustered at the electoral district level. Regressions are weighted, where weights given by number of votes at the polling station: ‘#referendum votes at the polling station/# total referendum votes’.

Table IV: Columns (1) – (4): Replication of Table 3 in the main text, with clusters at the Area Unit level. Columns (5) – (8): Replication of Table III above, with clusters at the Area Unit level. Dependent Variable: Support for MMP at the Polling Station.

	General Roll only				All electorates			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean MB Area within AU	-120.3*** (43.98)	-98.34*** (37.87)	-100.2** (44.31)	-45.69** (22.51)	-119.9*** (43.05)	-99.51*** (37.51)	-101.5*** (38.80)	-45.70** (17.96)
Pop. Density	1.320*** (0.261)	0.879*** (0.264)	0.695* (0.411)	-0.247 (0.361)	1.306*** (0.259)	0.893*** (0.262)	0.692** (0.290)	-0.243 (0.231)
	(0.149)	(0.149)	(0.185)	(0.127)	(0.150)	(0.151)	(0.145)	(0.112)
% Born in NZ	-0.277*** (0.0282)	-0.247*** (0.0283)	-0.256*** (0.0534)	-0.156*** (0.0449)	-0.269*** (0.0279)	-0.239*** (0.0280)	-0.249*** (0.0316)	-0.153*** (0.0233)
% Māori	0.132*** (0.0248)	0.0306 (0.0282)	0.0657 (0.0534)	0.155*** (0.0415)	0.121*** (0.0234)	0.0267 (0.0269)	0.0595** (0.0293)	0.151*** (0.0199)
% > 64 y.o.	-0.122 (0.0761)	-0.297*** (0.0770)	-0.248** (0.109)	-0.0646 (0.0796)	-0.112 (0.0762)	-0.278*** (0.0773)	-0.210** (0.0912)	-0.0477 (0.0691)
% College degree	0.390*** (0.0470)	0.323*** (0.0512)	0.325*** (0.0779)	0.313*** (0.0749)	0.392*** (0.0472)	0.329*** (0.0515)	0.331*** (0.0602)	0.315*** (0.0495)
% < NZD 20,000	-0.0478 (0.0541)	-0.297*** (0.0698)	-0.230** (0.108)	-0.00786 (0.0874)	-0.0614 (0.0543)	-0.297*** (0.0696)	-0.225*** (0.0763)	-0.00971 (0.0530)
Median income (in thousands of \$)	-0.377*** (0.0422)	-0.304*** (0.0468)	-0.286*** (0.0617)	-0.151*** (0.0377)	-0.382*** (0.0423)	-0.313*** (0.0467)	-0.292*** (0.0466)	-0.155*** (0.0316)
	(0.0659)	(0.0701)	(0.105)	(0.0706)	(0.0654)	(0.0694)	(0.0762)	(0.0514)
% Māori in Māori Roll (as in 1998)			-0.0283 (0.0208)	-0.0188 (0.0165)			-0.0235 (0.0164)	-0.0183 (0.0122)
% earns rents or dividends			-0.0865 (0.162)	0.364*** (0.125)			-0.110 (0.112)	0.355*** (0.0868)
% receives <i>some</i> benefit		0.482*** (0.0759)	0.498*** (0.135)	0.0563 (0.108)		0.455*** (0.0749)	0.457*** (0.105)	0.0426 (0.0759)
% full employment			0.176 (0.125)	0.202* (0.110)			0.183* (0.105)	0.203*** (0.0766)
Māori electorate (dummy)					9.361*** (0.556)	9.401*** (0.561)	9.500*** (0.578)	-4.913*** (0.681)
Party controls	NO	NO	NO	YES	NO	NO	NO	YES
R ²	0.319	0.341	0.352	0.659	0.332	0.350	0.362	0.660
Observations	3,104	3,104	2,961	2,960	3,617	3,617	3,449	3,334

*** Significant at 1% level; **at 5% level; *at 10% level.

Dependent variable: Percentage of votes for MMP at the Polling Station. All variables refer to *Area Unit* level data. Population density: (People per km^2)/1,000. Party controls: share of votes for Labour, for National, and for Alliance. Standard errors clustered at the Area Unit level. Weights are given by the ratio '#referendum votes at the polling station/# total referendum votes'.

Table V: Support for MMP at the Polling Station, by party support. All polling stations included (i.e., General Roll, Māori Roll and “special votes”. Hence, no sociodemographic controls can be added).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
% Labour	0.286*** (0.0112)	-0.0933*** (0.0117)	-0.0933*** (0.0117)	-0.0949*** (0.0116)	-0.0822*** (0.0120)	-0.0838*** (0.0119)	0.422*** (0.00890)
% National		-0.498*** (0.0137)	-0.498*** (0.0137)	-0.508*** (0.0136)	-0.464*** (0.0142)	-0.497*** (0.0138)	
% Alliance	0.535*** (0.0197)	0.146*** (0.0181)	0.146*** (0.0181)	0.132*** (0.0177)	0.155*** (0.0178)	0.138*** (0.0177)	
% Smaller parties							0.567*** (0.0120)
% REF. – % G.E.				0.628*** (0.0742)	0.639*** (0.0758)	0.636*** (0.0764)	0.683*** (0.0788)
log (# Polling stations)					-0.0396*** (0.00257)		
Total votes (in thousands)						0.0150*** (0.00227)	0.0144*** (0.00225)
Dummy Māori Electorate	0.0764*** (0.00571)	-0.0345*** (0.00471)	-0.0345*** (0.00471)	-0.0325*** (0.00595)	0.0377*** (0.00746)	-0.0416*** (0.00695)	-0.0534*** (0.00698)
Weights	YES	YES	YES	YES	YES	YES	YES
R ²	0.399	0.563	0.563	0.575	0.604	0.587	0.578
Observations	4,265	4,129	4,129	4,129	4,129	4,129	4,130

*** Significant at 1% level; ** at 5% level; * at 10% level.

Dependent variable: Percentage of votes for MMP at the Polling Station. % Smaller parties: Percentage of votes for all parties other than National or Labour. % REF. – % G.E.: (Total votes referendum-Total votes general election)/Total votes general election. log (# Polling stations): refers to the number of polling stations in the electorate. Weights are given by the ratio ‘#referendum votes at the polling station/# total referendum votes’.

Table VI: Replication of Table 4 with clusters at the Area Unit level. Support for MMP at the Polling Station, by party support, with sociodemographic controls (General Roll only).

Dep. Var.: Support for PR at polling station (in %)				
	(1)	(2)	(3)	(4)
% National	0.0807*			
	(0.0427)			
(% National) ²	-0.0071***			
	(0.0005)			
% Labour		0.6219***		
		(0.0667)		
(% Labour) ²		-0.0073***		
		(0.0008)		
% Alliance			0.7076***	0.5023***
			(0.0684)	(0.0620)
(% Alliance) ²			-0.0065***	-0.0037*
			(0.0011)	(0.0009)
% Nat. – % Lab.				0.3304***
				(0.0318)
(% Nat. – % Lab.) ²				-0.0025***
				(0.0001)
Clustered SE	YES	YES	YES	YES
Weights	YES	YES	YES	YES
Controls	YES	YES	YES	YES
R ²	0.6651	0.4023	0.4580	0.6503
Observations	2,961	2,961	2,960	2,960

*** Significant at 1% level; **at 5% level; *at 10% level.

Dependent variable: Percentage of votes for MMP at the Polling Station. Controls used (all refer to Area Unit level): mean meshblock area, population density, % women, % born in NZ, % Māori, % college degree, % > 64 y.o., % < NZD 20,000, median income, % Māori in Māori Roll, % earns rents or dividends, % receives *some* benefit, % full employment. Standard errors clustered at the Area Unit level. Weights given by number of votes at the polling station.

Table VII: Descriptive statistics, New Zealand Election Study, 1993 survey

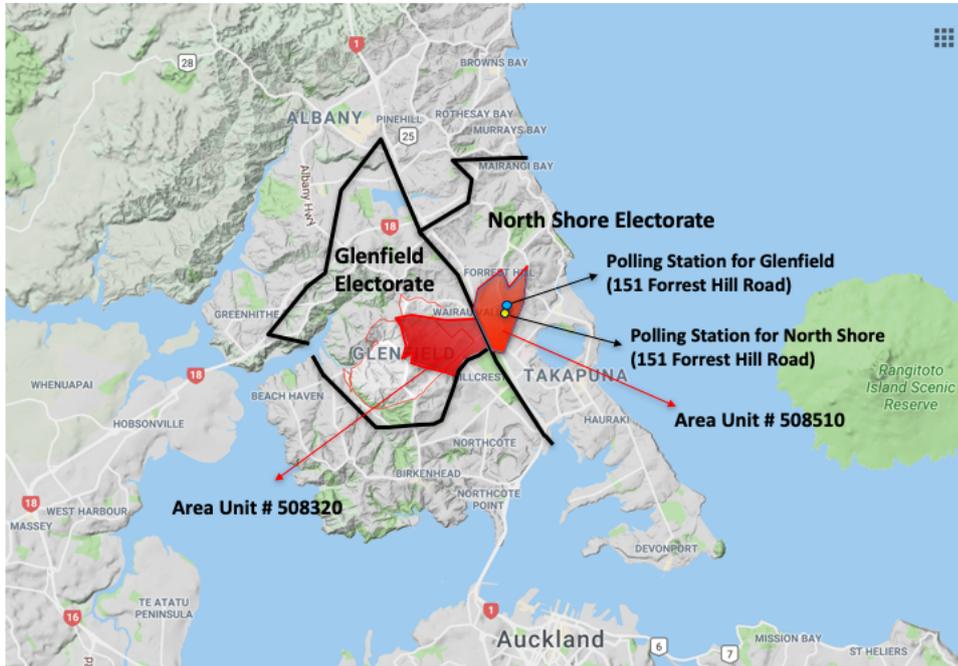
	Full 1993 Dataset		Cross-sectional analysis dataset	
	Mean	Std. Dev.	Mean	Std. Dev.
Voted for MMP in 1993 Referendum	0.51	0.5	0.55	0.5
Voted for FFP in 1993 Referendum	0.4	0.49	0.45	0.5
Did Not Vote in 1993 Referendum	0.09	0.29		
Voted for Change in 1992 Referendum	0.58	0.49	0.63	0.48
Supported FPP in 1992 Referendum	0.21	0.41	0.22	0.42
Did Not Vote in 1992 Referendum	0.21	0.41	0.15	0.36
Age	47.9	16.9	46.9	15.8
Female	0.51	0.5	0.48	0.5
NZ European	0.9	0.3	0.93	0.25
Māori	0.06	0.23	0.04	0.19
Other Ethnicity	0.05	0.21	0.03	0.17
Immigrant	0.17	0.38	0.17	0.38
No Qualifications	0.29	0.46	0.25	0.43
School Qualifications	0.39	0.49	0.39	0.49
Non-University Post-School Degree	0.2	0.4	0.23	0.42
University Degree	0.11	0.31	0.13	0.34
Employed	0.57	0.5	0.6	0.49
Retired	0.24	0.42	0.21	0.41
Non-Employed	0.2	0.4	0.19	0.39
Personal Income (thousands)	23.6	19.8	25.5	21
Personal Income Missing/Don't know	0.21	0.41	0.1	0.3
Personal Ideology - Extreme Left	0.08	0.27	0.08	0.28
Personal Ideology - Left	0.1	0.3	0.11	0.32
Personal Ideology - Central	0.32	0.47	0.33	0.47
Personal Ideology - Right	0.13	0.34	0.15	0.36
Personal Ideology - Extreme Right	0.08	0.27	0.09	0.29
Personal Ideology - Don't Know	0.29	0.45	0.23	0.42
General Trust - (Strongly) Agree	0.65	0.48	0.66	0.47
General Trust - Neither Agree/Disagree	0.12	0.33	0.14	0.35
General Trust - (Strongly) Disagree	0.18	0.39	0.17	0.37
General Trust - Don't Know	0.04	0.19	0.03	0.16
Trust Government - (Strongly) Agree	0.31	0.46	0.32	0.47
Trust Government - Neither Agree/Disagree	0.18	0.38	0.19	0.39
Trust Government - Disagree	0.37	0.48	0.38	0.49
Trust Government - Strongly Disagree	0.08	0.27	0.08	0.27
Trust Government - Don't Know	0.05	0.23	0.03	0.18
Knows Previous MP's name	0.75	0.43	0.8	0.4
Political Interest - Very Interested	0.15	0.36	0.17	0.37
Political Interest - Somewhat	0.48	0.5	0.53	0.5
Political Interest - Slight or less	0.36	0.48	0.3	0.46
Reads Newspaper - Often or Sometimes	0.63	0.48	0.68	0.47
Reads Newspaper - Rare or Never	0.37	0.48	0.32	0.47
Religion - None	0.25	0.43	0.28	0.45
Religion - Catholic	0.14	0.34	0.13	0.34
Religion - Protestant	0.6	0.49	0.58	0.49
Religion - Non-Christian	0.02	0.13	0.01	0.12
Politically Engaged (min=0; max=3)	2.23	1	2.56	0.75
Supports Principles of MMP (min=-4; max=4)	0.06	1.51	0.06	1.62
Voted Strategically in 1993	0.07	0.26	0.07	0.25
Did not vote in 1990	0.09	0.29	0.08	0.27
Voted for National in 1990	0.46	0.5	0.48	0.5
Voted for Labour in 1990	0.33	0.47	0.32	0.47
Voted for Alliance in 1990	0.07	0.25	0.07	0.26
Voted for Other parties in 1990	0.05	0.21	0.05	0.22
Whether changed vote from 1990 to 1993	0.47	0.5	0.43	0.5
Support to National (min=1; max=5)	2.81	1.3	2.82	1.35
Support to Labour (min=1; max=5)	2.89	1.12	2.83	1.11
Support to Alliance (min=1; max=5)	3.2	1	3.2	1.01
Did not vote in 1993	0.08	0.27	0.01	0.1
Voted for National in 1993	0.34	0.47	0.39	0.49
Voted for Labour in 1993	0.3	0.46	0.3	0.46
Voted for Alliance in 1993	0.18	0.39	0.2	0.4
Voted for Other parties in 1993	0.1	0.3	0.11	0.31
Auckland	0.23	0.42	0.24	0.43
Wellington	0.1	0.29	0.1	0.3
Christchurch	0.1	0.29	0.1	0.31
Other cities	0.27	0.45	0.28	0.45
Town	0.1	0.3	0.09	0.29
Countryside	0.2	0.4	0.19	0.39
Observations	2251		1296	

B Checking the validity of our assumption in section 5.2

In section 5.2 of the manuscript we assume that when polling stations serve two electorates (i.e., they have a voting booth for each), then all voters who cast a vote in that polling station share the same socioeconomic characteristics, regardless of the voting booth they effectively cast their vote in.

In order to check whether such an assumption holds, we do the following: for each polling station that holds voting booths for two electoral districts, we first mark down the area unit it is located in. Next, we select the area unit where voters from the nearby electorate are most likely to come from. Take, for instance, the Presbyterian Church Hall at 151 Forrest Hill Road, Forrest Hill, which contained two polling stations: one for North Shore electorate, and one for Glenfield electorate (see Figure I below). The Presbyterian Church Hall is situated within area unit 508510, which is inside the North Shore electorate. Since voters from Glenfield electorate who cast a vote at the Presbyterian Church Hall are most likely to come from area unit 508320, we select that one for comparison.

Figure I: Example of pairwise matching



Example of a polling station that has ballot boxes for more than one electorate: Presbyterian Church Hall at 151 Forrest Hill Road, which has ballot boxes for both ‘North Shore’ and ‘Glenfield’ electorates. The areas in red represent Area Units.

Once selected, we compare these two area units in terms of their sociodemographic characteristics (percentage of college degree holders, ethnically Caucasian, ethnically Māori, females, full-time job holders, etc.). To be precise, we create a measure that

takes the absolute difference between both: if, say, in Area Unit 508320 23% of the population hold a college degree, whereas in the other one (Area Unit 508510), only 21% hold a college degree, then our measure is 2%.

We compute the same measure for all other pairs, and take the mean and the median difference across all of them. We do so for each particular socioeconomic characteristic – eleven in total. Small values of such average/median difference imply that our assumption is correct (i.e., the contiguous area units are very similar), whereas larger values would imply that they are dissimilar, and hence our assumption questionable.

Table VIII and Figure II show results for all eleven characteristics we compare. All median differences are between 1.23% and 4.54%. Averages range between 1.87% and 6.83%. As Figure II clearly shows, averages are larger because the presence of outliers: for one or two pairs, differences are large. For all other pairs (around 140 pairs), differences are very small. In other words, all contiguous relevant area units are very similar in sociodemographic characteristics: the differences we observe are the differences one would expect just by statistical chance.

Table VIII: Differences across contiguous area units that belong to different electorates: average and median. Sample used: for each polling station serving two or more electorates, we select the area unit it is located in, and the area unit where voters from the neighboring electorate are most likely to come from (i.e., by construction a contiguous area unit).

	Difference	
	Mean	Median
% Women	1.87%	1.23%
% \leq 24 years old	4.61%	3.46%
% \geq 65 years old	3.61%	3.12%
% Born in NZ	4.44%	2.83%
% White/Caucasian	6.72%	4.54%
% Māori	4.20%	3.07%
% Univ. Degree	3.66%	2.23%
% NZ\$ 20,000 or less	6.83%	4.45%
% Receives <i>some</i> benefit	5.50%	4.53%
% Full time employed	4.81%	3.29%
% Earns rents or dividends	3.46%	2.81%
Observations	141	

Figure II: Differences across contiguous area units that belong to different electorates, by characteristic.

