Maori in New Zealand: Voting with their Feet?

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Abstract

Maori in New Zealand have the right to choose whether they want to vote in a General district (with all other citizens) or in a Maori-only district. Should they wish, they have the option to switch from one to the other every five years. The goal of this paper is to check whether they are strategic in their enrollment decisions. If strategic considerations affect their decisions, Maori should register in the district in which they expect a closer race, so that their vote is more likely to be pivotal. This paper gathers census and enrollment data from 2006, and electoral results from 2005, to analyze the reasons why Maori opt for one or the other roll. Results suggest that pivotal considerations are a relevant factor for Maori population. Also, ethnic and cultural allegiances and socioeconomic status seem to play a key role in enrollment decisions.

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1 Introduction

Whether agents act strategically or not in elections has been a recurrent topic in both economics and poltical science. Most of the literature has focused on whether actions are strategic in the voting booth. There have been two main approaches in this regard. First, trying to infer a model of voting behavior from the stated preferences and expectations of respondents in preelectoral surveys.[1] This strand of research faces the problem that answers to survey questions are not incentive compatible. To overcome this issue, other authors have used data from actual elections, dis-aggregated at a polling station level, i.e. they have used revealed preferences. Nonetheless, when using this approach, one needs to impose strong structural assumptions.[2]

The electoral law in New Zealand offers an ideal situation for the study of strategic political behavior which relies in revealed preferences and does not require the imposition of strong structural assumptions. In New Zealand, there are two kinds of electoral districts (called 'electorates'): General and Maori. All citizens are forced to register in the General roll by law, with the exception of Maori. Citizens of Maori descent can choose whether they want to register in the General roll, or whether they want to register in the Maori roll, in which only Maori can enrol. Given that registration is based on geographical residence, in practice, this means they have to choose between a particular general district and a particular Maori district.[3]

The consequences of this choice are not irrelevant. First, the local representative in parliament is decided at the district level. Second, winning the elections in one district guarantees parliamentary representation for a party, which may have dramatic consequences for small parties. [4] Third, the number of Maori and General elecorates may vary with time: in particular, for roughly every new 60,000 citizens registered in the Maori roll, a new Maori electorate is created. Details on how

[1] See, for instance, Alvarez et al. (2006), Black (1978), Ordeshook and Zeng (1997) or Kedar (2009).

[2] See Degan and Merlo (2011) or Kawai and Watanabe (2010).

[3] In fact, following constitutional law, electoral boundaries and the number of districts vary over time in New Zealand. Nonetheless, boundary changes from one election on to the next are not dramatic, and affect only a very small portion of the population.

[4] I give full details of how the system works in section 2).

electorates are designed can be found in Appendix 6.3.

The goal of this paper is to assess whether Maori choose to register in the electorate in which their vote is more likely to be pivotal. They register in one of the two rolls (General or Maori) when they turn eighteen. However, every five years an 'Electoral Maori Option' is implemented, during which Maori have the chance of switching from one to the other.[5] Switching roll is virtually costless: it can be easily done online, for free, and in a couple of minutes. Details are given below in section 2.2. The main hypothesis tested in this paper is that, when there is an 'Electoral Maori Option', Maori assess how close they expect the elections to be in the district they are registered and the one they could switch to, and choose to enroll in the one in which the race is expected to be closer .

In order to test it I use registration and census data from 2006 and electoral results from 2005. Regarding the census data, the unit of analysis in New Zealand is the meshblock. There are around 44,000 meshblocks in the country, the average population being slightly more than one hundred. For each meshblock I know how many Maori people live there, and how many are registered in each roll. Other than that, the census provides all sorts of socioeconomic measures per meshblock.[6]

Since I do not have the agents' expectations on electoral outcomes, I proxy them using the electoral results from the 2005 legislative elections (the last ones before the 2006 'Electoral Maori Option'). The dataset includes the number of votes all candidates won in each of the 63 general and seven Maori districts, and is publicly available at `http://www.electionresults.govt.nz`.

The main exercise of this paper is to assess whether there is a correlation between (a) the proportion of Maori registered in the Maori roll in a meshblock after the 'Electoral Maori Option' of 2006 and (b) closeness of the results in the previous elections. For each district, I construct a mea-

[5]So far this has happened in 1997, 2001 and 2006. The following one was scheduled for 2011, but to to the Christchurch earthquake on February 22, 2011, it was re-scheduled for 2013.

[6]Data on unemployment, distribution of income, education, national and ethnic origin, transportation, ownership, etc.

sure of closeness of the results which is standard in the literature: distance in vote shares between the winner and the runner-up. I run a partially linear model, in which the functional form of the effect of closeness on enrollment is not specified.

Results seem to confirm that one of the reasons behind Maori's choice is closeness of past elections. That is, Maori seem to choose the roll in which the immediately past elections were closer. These results hold whether one weights meshblocks by Maori population or not. Further robustness checks using different specifications also support the finding that Maori seem to be strategic in their choices. Interestingly, this paper also finds that socioeconomic characteristics are a key determinant of enrollment decisions: there appears to be a clear split within the Maori. Well-educated and wealthier Maori prefer to enrol with the rest of the population, whereas less educated and poorer Maori seem to prefer to register in Maori-only districts.

This article proceeds as follows: section 2 describes the electoral system in New Zealand. The data and political context around 2005 are described in section 3. Results are presented in section 4 and section 5 concludes.

2 The electoral system in New Zealand: Mixed Member Proportional (MMP)

2.1 How MMP works

New Zealand is a parliamentary representative democratic monarchy. This means that the executive branch is not directly elected by the people, but by Parliament, to which it is held accountable. The New Zealand Cabinet is responsible to New Zealand Parliament from which its members are derived. All Cabinet Ministers must be Members of Parliament (MPs) and are collectively responsible to it.

In the MMP system, each citizen casts two votes: the *party vote* and the *electorate vote*. The party vote consists of choosing among a set of closed party lists. The set of all lists is the same for all citizens across the nation. Citizens can vote for at most one list. The electorate vote consists of choosing one candidate that will represent the electorate (district) in parliament. The set of candidates differs by electorate. Citizens can vote for at most one candidate. The electorate vote determines who will be the local representative of the district in Parliament, and it is based on first past the post (FPP henceforth).

MMP works as follows: in order to determine how many of the 120 parliamentary seats each party wins, the electoral commission first determines which parties are eligible for a proportional share of seats. These are parties that have won either 5% of the total number of party votes or have won at least one district in the electorate vote.

Once the competing parties are determined, seats are allocated taking into account *only* party votes.[7] All nationwide party votes are tallied together, and the allocation of seats is done using the Sainte-Laguë system.[8] Hence the number of MPs a party gets is fully determined by the party vote (except for a particular situation described below). The candidates who occupy these seats are the local winners in the electorate vote. If a party wins more seats than electorates (which is the usual, given that there are 120 seats and 69 electorates), then these extra seats are allocated according to the party list presented at the party vote.

The impact of the electorate vote is significant only in two major circumstances. First, when a party with less than 5% of the party vote wins a district with the electorate vote. In that case, despite not making the threshold, such party enters the competition for party seats, and it may even win more than one seat if the percentage of party votes is sufficiently large. Second, when the

[7] If an independent candidate has won an electorate seat, the the number of seats to be distributed is reduced to 119.

[8] See Appendix 6.4 for details on the Sainte-Laguë system.

number of electorate seats won by a party is larger than the number of seats allocated via party vote. In that case the party keeps as many seats as electorates won - this is the only sitaution in which the party vote shares do not fully determine the number of seats in parliament. As a result, the number of MPs in that particular legislature is increased to match the number of electorate seats won by that party. For instance, if the distribution of seats according to the party vote gives one party 45 seats, whereas this party has won in 48 electorates, then the number of parliamentary seats is increased to 123. This is known as overhang. If a party does not have enough people on its list to fulfill its quota, then there is an underhang (the number of MPs for the legislature is reduced to less than 120).[9]

2.2 The Maori Option

There are two kinds of electorates in New Zealand: General and Maori.[10] General electorates are those in which every citizen can enroll. Currently there are 63.[11] Maori electorates are those in which *only people of Maori descent* may choose to enroll. Currently there are seven. These electorates overlap each other. That is, as Figures 1 and 2 show, the 63 general electorates completely cover the land of New Zealand, and so do the seven Maori electorates. This means that when choosing in which roll to register, Maori do not have to physically move. They are mostly choosing in what box to cast their ballot in election day. All parties can freely contest in both kind of electorates.

The choice Maori make is not a lifetime choice: approximately every five years, there is a period of three months known as the 'Electoral Maori Option' during which citizens of Maori descent may change the roll in which they are registered (from Maori Roll to General Roll or viceversa). There have been three Maori Electoral Options since in 1994 New Zealand adopted MMP: 1997, 2001 and 2006.[12] Due to the Christchurch earthquake on February 22^{nd}, 2011, the Maori Option scheduled

[9] No underhang has occurred thus far. However, overhangs have: in 2005 (121 MPs), in 2008 (122) and in 2011 (121).

[10] Note that enrollment is compulsory in New Zealand, although voting is not

[11] There were 62 before the 2006 Census.

[12] See details at `http://www.elections.org.nz/enrollment/Maori-option-now/Maori-option-results.html`

for that year was postponed until 2013.

Maori enrollment choices have an effect on the number and delimitations of Maori electorates. Every five years, after the 'Maori Electoral option', the Representation Commission reviews and redraws the electorate boundaries. The exact number Maori electorates depends on the proportion of Maori enrolled in the Maori roll: by and large, for every 60,000 new Maori registered in the Maori Roll, one new Maori electorate is gained. Thus, the number of Maori electorates has increased from five in 1996 to six in 1999 to seven since the 2002 elections. By registering in the Maori Roll, a Maori citizen is increasing the chances of having one more Maori electorate.[13]

3 The Data and Context

The main hypothesis to be tested is that Maori agents choose to enroll where they can be more pivotal *in the future*. The assumption is that they look at the electorate results in the immediately previous elections in order to make inferences about potential future pivotavility.

To test this, I use four different datasets. The first one is the electoral results for the 2005 elections.[14] I need only the results for the electorate vote, so as to measure how close the elections where at each district. This dataset contains the number of votes of all candidates contesting at each electorate.

The second dataset I use is census data from 2006.[15] The smallest unit of analysis are Meshblocks, which are typically small: the average population is around a hundred people in a meshblock.[16] New Zealand census data includes the standard socioeconomic information that any census

[13] For more details, see `http://www.elections.org.nz/Maori/ntkm-democracy/reviewing-electorates.html`

[14] This is free and available at : http://www.electionresults.govt.nz/

[15] Census data available at `http://www.stats.govt.nz`

[16] As Statistics NZ defines it, 'A meshblock is the smallest geographic unit for which statistical data is collected by Statistics New Zealand. Meshblocks vary in size from part of a city block to large areas of rural land. Each meshblock abuts another to cover all of New Zealand, extending out to the 200-mile economic zone (approximately 320 kilometres). Meshblocks aggregate to build larger geographic areas, such as area units, territorial authorities, and regional councils.'

includes.

The third dataset I use describes at a meshblock level how many Maori were registered at each roll as of August 8, 2006 (that is, six days after the Electoral Maori Option was closed). Finally, the forth dataset links each particular meshblock to the electorate it belongs to.[17] The publicly available Census data does not specify to which electorate each meshblock belongs to. I am especially grateful to working staff at Statistics NZ and the Electoral Enrollment Centre for having provided me with the two latter datasets.

3.1 Descriptive Statistics

There were 41,384 meshblocks in New Zealand in 2006. I can locate 40,441 of them in a given electorate (97.72% of the total).[18] Table 1 provides the summary statistics for these 40,441 meshblocks. We can see that the average meshblock is quite small (around 110 people). Also, this table shows that the average fraction per meshblock of Maori registered in the Maori roll is nearly 50%[19], with a large standard deviation (29.2%). Hence we can see that there is substantial variability in Maori enrollment from one meshblock to another.

3.2 Parties and Political Context in the 2005 Legislative Elections

New Zealand politics were by and large a two party system until the turn of the century. The Labor Party and the National Party have dominated the scene since 1935 (the United & Reform coalition government from 1931 to 1935 was the last one not to be led by either National or Labor). With the FPP system both together used to easily win more than 90% of the MPs in all elections. Nonetheless, since the establishment of MMP in 1994, other parties have become quite powerful in the political arena, although never enough to lead any government.

[17] Note that given the dynamic nature of the electoral boundaries in New Zealand, meshblocks can be switched across electorates.

[18] This means that I lose 4,749 citizens [as in 'Usually Resident Population Count'], i.e. 0.1% of the total population.

[19] Note that this does not necessarily mean that nearly 50% of the Maori were registered in the Maori roll: actually the exact measure was 42.41%

Figure 3 shows the distribution on the Left-Right scale of the eight parties with parliamentary representation after the 2005 elections. It shows the average of the respondents' answers in the NZES survey of 2005.[20] Table 2 shows the results and seat distribution after the elections. We can see that it was a close contest, with leftist Labour winning 50 seats and rightist National 48. The government formed was a minority coalition between Labour and the Progressive Party, with parliamentary support from New Zealand First and United Future.

What is most relevant about Table 2 is the fact that the Maori party won all its seats thanks to the electorate vote. It fell short of the 5% in the party vote needed to gain representation (2.12%). However, it won four electorates in the electorate vote. This secured the party four seats in parliament. It has not been the only time when the electorate vote has been critical for the success of the Maori party. It has gained representation this way in all general elections since it was founded in 2004. In the general elections of 2008 it won five seats, whereas it won three in 2011.

3.3 Maori Electorates: an overview

Since 1868 and until 1996 ther number of Maori electorates was fixed to four. In 1994, with the establishment of MMP, the rules regarding the boundaries and number of Maori electorates were changed (see Appendix 6.3 for details). Thus, in 1996 the number was extended to five, and the Electoral Commission increased it again to six in 1999. Since 2002, the number of Maori electorates has been seven (although the boundaries and composition of these electorates have changed).[21]

Traditionally, more progressive parties have dominated the Maori electorates. That is, the Liberal party dominated until 1935 . From then onwards, until 1996, the Labour party dominated the Maori electorates. In 1996 it was New Zealand First who won all Maori electorates but one, the main reason being that its leader Winston Peters was part Maori. However, in 1999 and 2002

[20] Data is available online at `http://www.nzes.org/exec/show/2005`
[21] For an extraordinary summary of this issue, see Geddis (2006).

Labour regained majority in those electorates.

Ethnic politics did not seem to play a major role in New Zealand until the creation of the Maori party in 2004. The Mana Maori party had contested in all elections since 1993 but never even reached 1% of the party vote. Since 2005, however, as stated above, the newly formed Maori party (not to be confused with Mana Maori) has won seats in all general elections.[22]

This seems to make the decision on which roll to register e even more critical than in the 1993-2002 period. Until 2002 (except in 1996), what was at stake in the Maori electorates was the name of the local representative. Both Labour and National were always expected to win parliamentary seats, so winning a single electorate was not critical. What all elections since 2005 have shown (and also the ones in 1996) is that there is more at stake than a name: nowadays whether the Maori party enters parliament is what is at stake. Therefore, for those citizens who support Maori politics there is a huge incentive to register/switch to the Maori roll: the Maori party has never been quite close enough to the 5% threshold in the party vote. Hence, securing at least one electorate has been critical for the Maori party.[23]

4 Results

4.1 Identification Strategy: Semi-Parametric Specification

Following the literature, I define distance of contention in a particular electorate as

$$DC \equiv \text{Share of votes } 1^{st} - \text{Share of votes } 2^{nd} \tag{1}$$

[22]The Maori party was formed on 7 July, 2004, by former Labour minister Tariana Turia and the well-known scholar Pita Sharples.

[23]Ironically, there is also an incentive for those Maori who dislike the Maori party: they may want to register in the Maori roll to vote for the party who may beat the Maori at the local level. Or they may resort to register in the General roll, therefore aiming to decrease the number of Maori seats in Parliament.

Using (1) one may define closeness:

$$\text{CL} \equiv 1 - DC \tag{2}$$

CL_{gen} refers to closeness in the 2005 elections in the general district the particular meshblock belonged to, whereas CL_{mao} refers to the Maori roll. Using both I define DIFF:

$$\text{DIFF} \equiv CL_{mao} - CL_{gen} \tag{3}$$

The closer the results in the Maori district compared to the general district, the larger the value DIFF takes. If Maori voters register where they think they can be more pivotal, we should find a positive correlation between Maori registration in Maori roll in 2006 and the variable DIFF.

Finally, the dependent variable is $\%\text{MAO}_i$, which is defined as the proportion of Maori registered in the Maori roll at each meshblock i, i.e.

$$\%MAO_i \equiv \frac{\text{\# Maori registered in Maori roll}}{\text{\# Maori living in the meshblock}} \tag{4}$$

In order to give some flexibility to the relationship between Maori enrollment and closeness of the results, I use a partially linear model:

$$\%MAO_i = X_i\beta + g\left(DIFF_i\right) + \varepsilon_i \tag{5}$$

where $g(.)$ is an unknown function. X_i is a vector of sociodemographic controls for each meshblock i: number of Maori, % female, % below 30 years of age, % Maori, % owners of residency, % with college degree, % receiving unemployment benefits, % earning NZ$20,000 or less annually, % who drove a car to work the day of the Census and % not in the labor force. In order to estimate g, I follow Härdle et al. (2000). Details are given in appendix 6.5.

I first estimate g without weights, and then I estimate it weighting each meshblock by the number of Maori people resident in it. The unweighted estimation is plotted in Figure 4 All four panels seem to confirm that there indeed seems to be more % registered in the Maori roll in those meshblocks in which the race in the Maori electorate was closer than in the General electorate. Next I use weights: Figure 5 shows a similar pattern, although the relation is not perfectly monotonic in all different specifications.

4.2 Linear Regression and the Impact of Socioeconomic Characteristics

I next run an OLS. The regression specification is the following:

$$\%MAO_i = \alpha + X_i\beta + DIFF_i\gamma + \varepsilon_i \tag{6}$$

γ is now the main parameter of interest and is expected to be positive. α, X_i and β are the same as in (5).[24] As above, I run (6) with and without weights. Weights are based on the number of Maori people resident in the meshblock. Overall, results without weights are the same as when using them (see Tables 3 and 4, respectively).

There are two interesting stories these tables bring on to the surface: first, the strategic component in registration behavior seems to be confirmed (i.e. γ is positive and significant). Second, socioeconomic background seems to be a clear and definite predictor of enrollment behavior.

Regarding the strategic component, Maori seem to register more in the Maori roll when the race in Maori electorates has been closer in the previous elections. The effect is small but significant in most specifications. DIFF seems to have an effect: the larger its value, the more Maori register in the Maori roll. When incorporating DIFF^2 (see columns (4) and (5) in both tables), DIFF loses

[24] An alternative specification would be to run:

$$\%MAO_i = \alpha + X_i\beta + CL_{gen}\gamma_g + CL_{mao}\gamma_m + \varepsilon_i \tag{7}$$

In this case, γ_g is expected to be negative whereas γ_m is expected to be positive. Results confirm the hypothesis, although γ_m is not significant, mostly due to the lack of variability (only seven Maori electorates in 2005). Results not shown but are available upon request.

its significance, suggesting that meshblocks where the race in the Maori district was *much* closer than in the general one are driving the results. Figures 6 and 7 depict the magnitude of the effect of closeness of previous electoral results on enrollment (for unweighted data). To be precise, I plot the predicted % of Maori registered in the Maori roll at the mean of all variables.[25] One can check that, for the average meshblock, the predicted fraction of Maori registered in the Maori roll when DIFF=-1 is 41.9%, whereas for DIFF=1 it is 44.1%. The overall change is around 2.2%. When including DIFF^2, we can see (Figure 7) that the magnitude of the change seems to double: from 46% when $DIFF = -1$ up to 51% when $DIFF = 1$.

This 5% effect does not appear to be very large. Taking a closer look at Figure 7, we can see that the most significant effect seems to take place at positive values of DIFF. That is, when results in the Maori roll are much closer, Maori seem to swtich to that roll, but not viceversa.

What seems to be determining Maori choices is their sense of Maori identity and their socioeconomic background. First, the proportion of Maori in the meshblock is a very good predictor of Maori choices. We can see that in all specifications of the weighted and unweighted regressions it turns out to be a significant explanatory variable. Also, what these tables unambiguously show is that there is a clear correlation between income and education on the one hand and enrollment choices on the other: the proportion of home owners and people with college degree seems to have a negative effect on registring in the Maori roll. On the other hand, the larger the fraction of unemployed people, and the larger the fraction of citizens living with NZ$20,000 or less per year in a given meshblock, the more Maori register in the Maori roll.

It is worth noting that the magnitude of these effects is by no means small. This is shown in Figure 8. In that figure I plot the independent effect of four variables, one at a time, taking the value of all other variables to be constant at the mean (these four variables are % Maori in the meshblock, % with NZ$ 20,000 or less a year, % home owners and % with college degree). The

[25] Figure 7 uses the estimated value of the parameters from column (5), Table 3. Figure 6 uses the estimated value of the parameters from an regression not shown: the same as in column (5), but without DIFF^2

value of the parameters are all taken from an OLS regression that includes all the squared values of the regressors, that is

$$\%MAO_i = \alpha + X_i\beta_1 + X_i^2\beta_2 + DIFF_i\gamma_1 + DIFF_i^2\gamma_2 + \varepsilon_i \tag{8}$$

Results for (8) are not shown as they are very similar to those without using squared variables.

For the average meshblock, increasing the proportion of home owners from zero to one nearly halves % of Maori in the Maori roll (Panel a). Similar conclusions can be reached for % with college degree in Panel (d). The largest effect however seems to come from having Maori neighbors (Panel c): in the limit, the average meshblock with no maori would have around 45% of Maori registered in the Maori roll,[26] whereas when the whole population in the meshblock is Maori, enrollment rises up to 75%. We can see in Panel (b) that income has an effect too, albeit much smaller in size.

5 Concluding Remarks

This paper takes advantage of the fact that Maori in New Zealand have the right to choose where to register in order to analyze whether agents are strategic when they take political decisions. It uses cross-sectional data (census and enrollment data from 2006, electoral results from 2005) in order to make the analysis. Results suggest that Maori agents are strategic, since they seem to register where their vote is more likely to be pivotal.

Also, this paper shows that their sense of identity and their socioeconomic background seem to be critical for Maori in order make enrollment decisions. First, results suggest that Maori tend to register more in the Maori roll when the number of Maori living around them increases (both in absolute and relative terms). Moreover, this paper shows that in impoverished and less educated

[26] Obviously this is in the limit when the fraction of Maori converges to zero, i.e. there should be a discontinuity at 0: when there are no Maori there can possibly no Maori in the Maori roll

areas, Maori tend to register more in the Maori roll, as opposed to the General roll.

One possible explanation is that more educated and well off Maori may want their social status in society to be corresponded by a registration in the General roll. Another possible explanation is that impoverished areas may care *more* about who the local MP is. Given that viable candidates in the Maori electorates are always from Maori descent, Maori citizens in more disadvantaged areas may register in the Maori roll in the hope to make sure that a candidate of Maori descent gets elected directly into parliament.

Given that roughly for every 60,000 new Maori registered in the Maori roll a new Maori electorate is created (and therefore one more Maori-only seat in parliament), it is very likely that enrollment decisions are also based on the intention of producing this effect. None of the variables used in this article fully captures ideology, although it is possible that a sense of Maori identity is stronger in those areas in which the fraction of Maori is larger. Therefore, fraction of Maori in the meshblock could partially be capturing this parallel strategic aspect of registration decisions.

Overall, the 2006 Electoral Maori Option saw 7,294 Maori switching from the Maori to the General roll, and 14,294 switching the other way around. That is, 5.75% of Maori who were already registered in 2001 decided to switch roll. This opens up very interesting avenues of research. Panel data would be needed to fully understand the reasons behind this switch. Enrollment data from right after the 1997, 2001 and 2013 Maori options could provide further insight in regards to political strategic behavior in mixed proportional systems. That is, it is necessary to study whether changes in the proportion in Maori enrolled in the Maori roll by meshblock can be explained by changes in the socioeconomic status by meshblock, as well as by electoral results.

Finally, it could be worth investigating how parties react to these registration patterns. Do they target specific groups when they decide the local candidates? Do they concentrate their campaign rallies in particular electorates? Much work needs to be done.

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6 Appendix

6.1 Figures

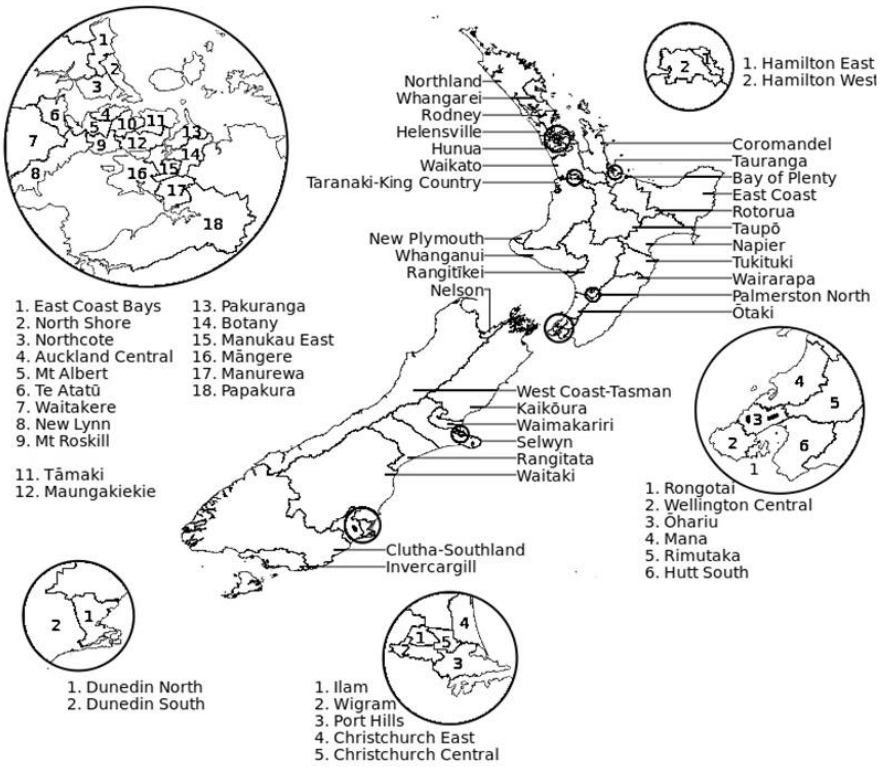

Figure 1: Map of the General Electorates in New Zealand (2011). Taken from `http://en.wikipedia.org/wiki/50th_New_Zealand_Parliament-April2012`

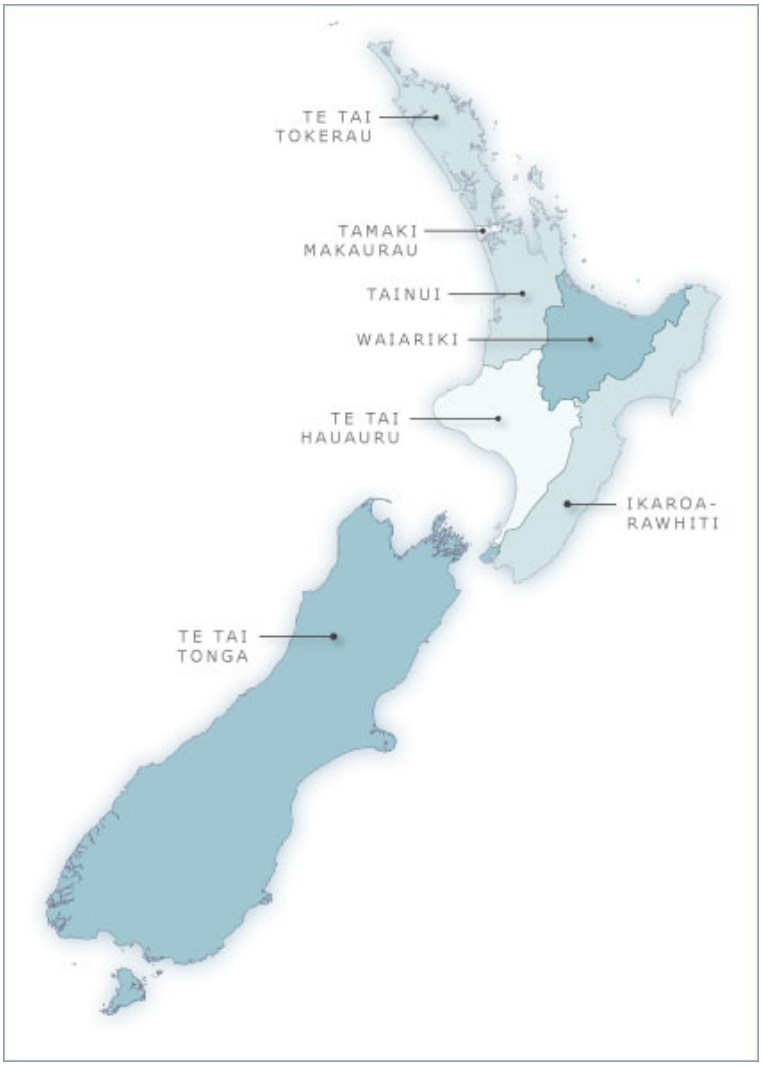

Figure 2: Map of the General Electorates in New Zealand (2004). Taken from `http://www.teara.govt.nz/en/nation-and-government/5/5-April2012`

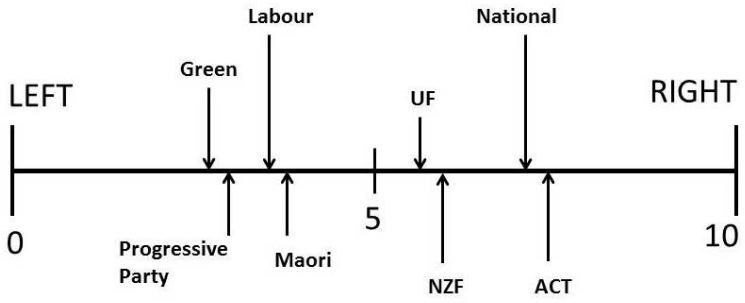

Figure 3: Position of the parties in the Left-Right spectrum. Source: Average of respondents answers, NZES 2005.

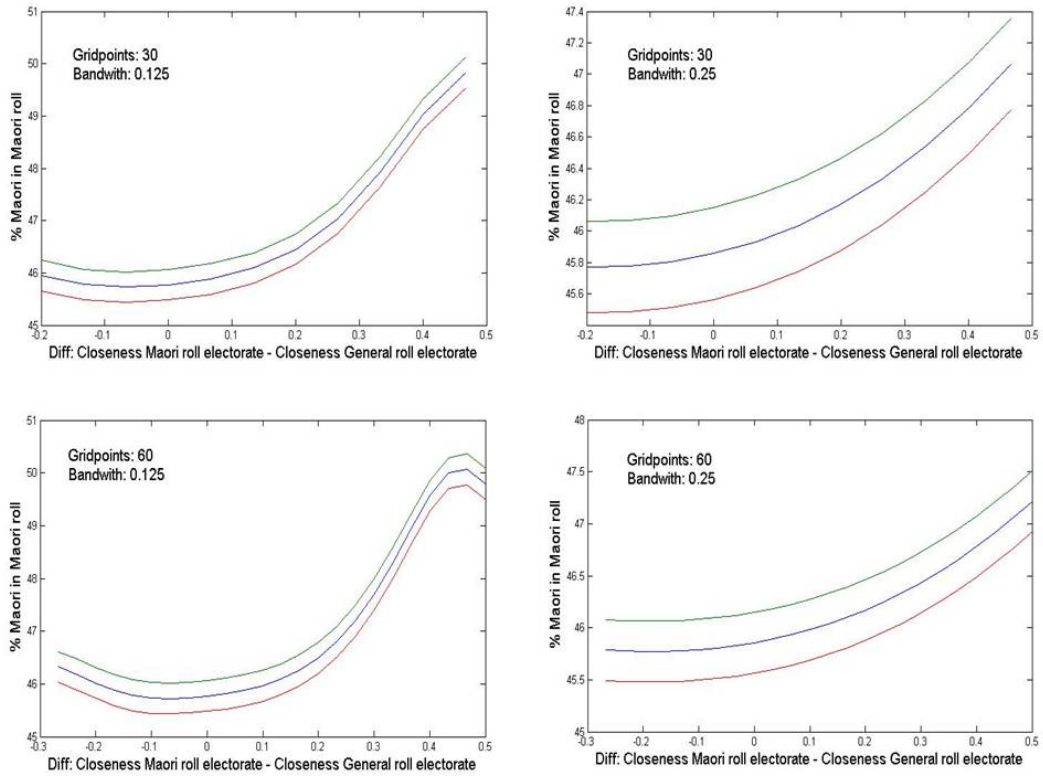

Figure 4: Correlation between closeness in the General roll electorate in the 2005 elections and the % of Maori registered in the Maori roll in 2006, controling for sociodemographic characteristics of the meshblocks.

Non parametric unweighted estimation as defined in (5), based on Härdle et al. (2000).
Closeness electorate result in General roll (2005) = 1 - distance of contention, where distance of contention = share of votes winner - share of votes runner-up in the general electorate.
In each panel I specify the number of gridpoints taken for estimation, as well as the bandwidth used for the Kernel. For more details, see subsection 6.5.

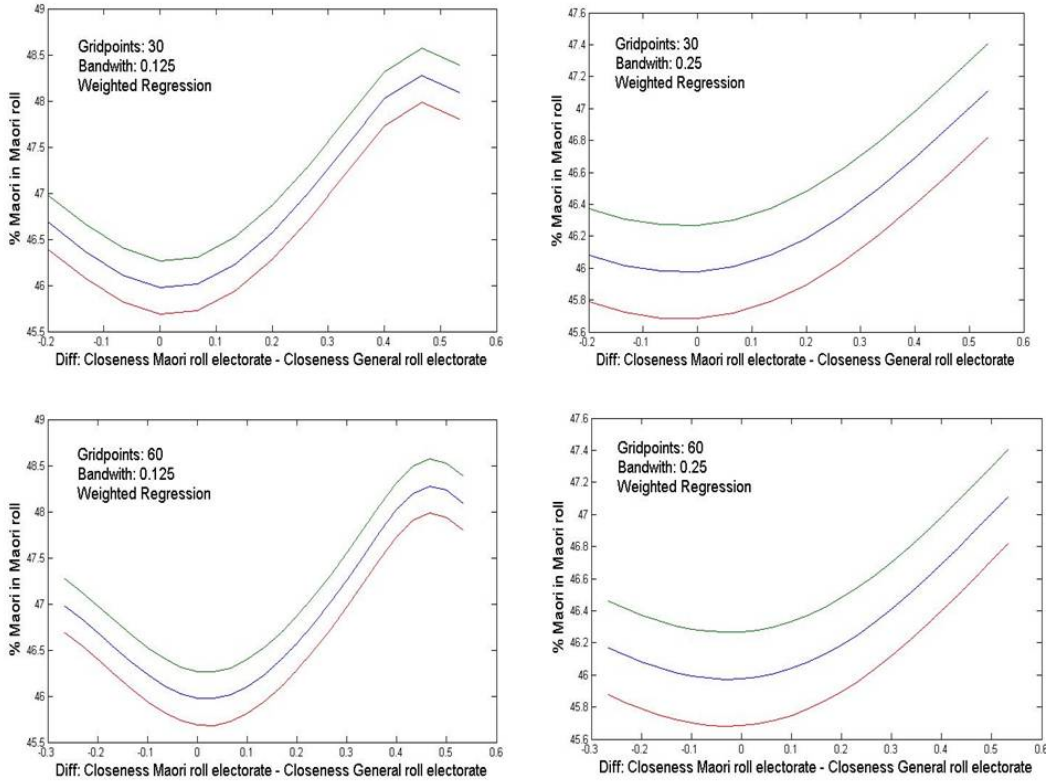

Figure 5: Correlation between closeness in the General roll electorate in the 2005 elections and the % of Maori registered in the Maori roll in 2006, controling for sociodemographic characteristics of the meshblocks.

Non parametric weighted estimation as defined in (5), based on Härdle et al. (2000).
Closeness electorate result in General roll (2005) = 1 - distance of contention, where distance of contention = share of votes winner - share of votes runner-up in the general electorate.
In each panel I specify the number of gridpoints taken for estimation, as well as the bandwidth used for the Kernel. For more details, see subsection 6.5.

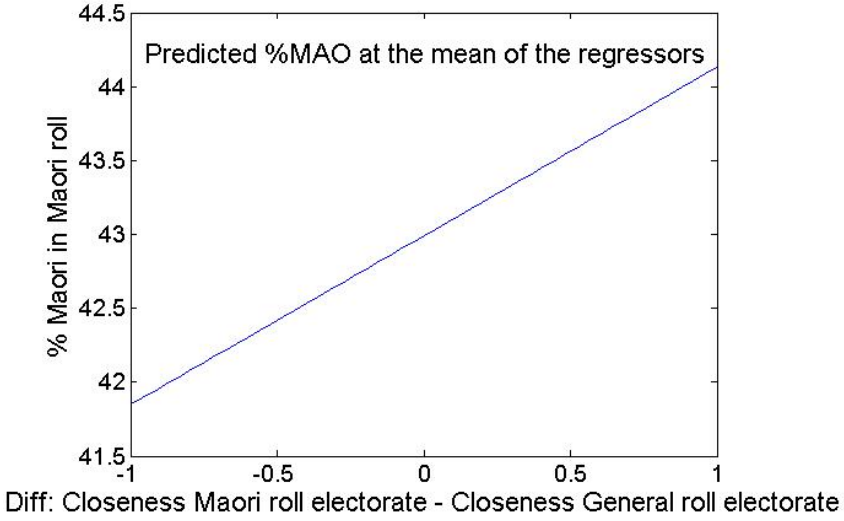

Figure 6: Predicted % of Maori registered in the Maori roll for all possible values of DIFF (= Closeness Maori electorate - Closeness general electorate). These predicted values are taken at the mean of the variables, using the value of the parameters estimated from (6) including (# Maori)^2 and (# Maori)^3.

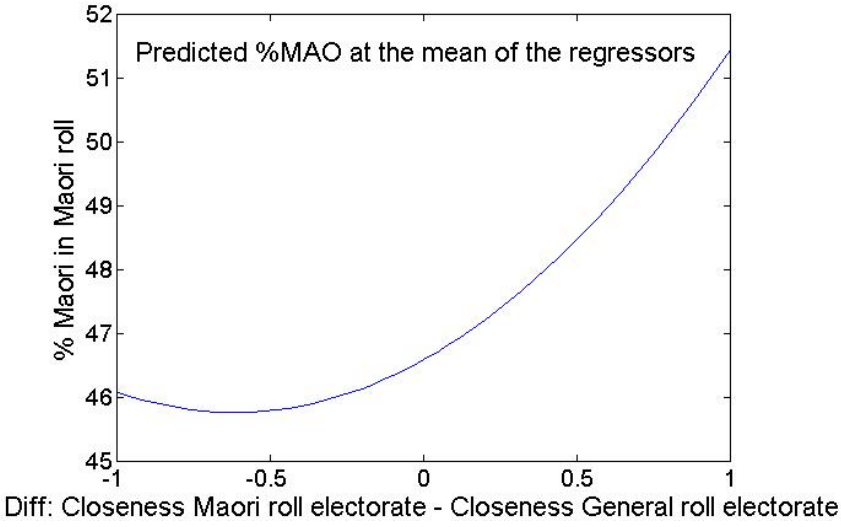

Figure 7: Predicted % of Maori registered in the Maori roll for all possible values of DIFF (= Closeness Maori electorate - Closeness general electorate). These predicted values are taken at the mean of the variables, using the value of the parameters estimated from (6) including DIFF^2, (# Maori)^2 and (# Maori)^3 (the value of these parameters is reported in column (5) of Table 3).

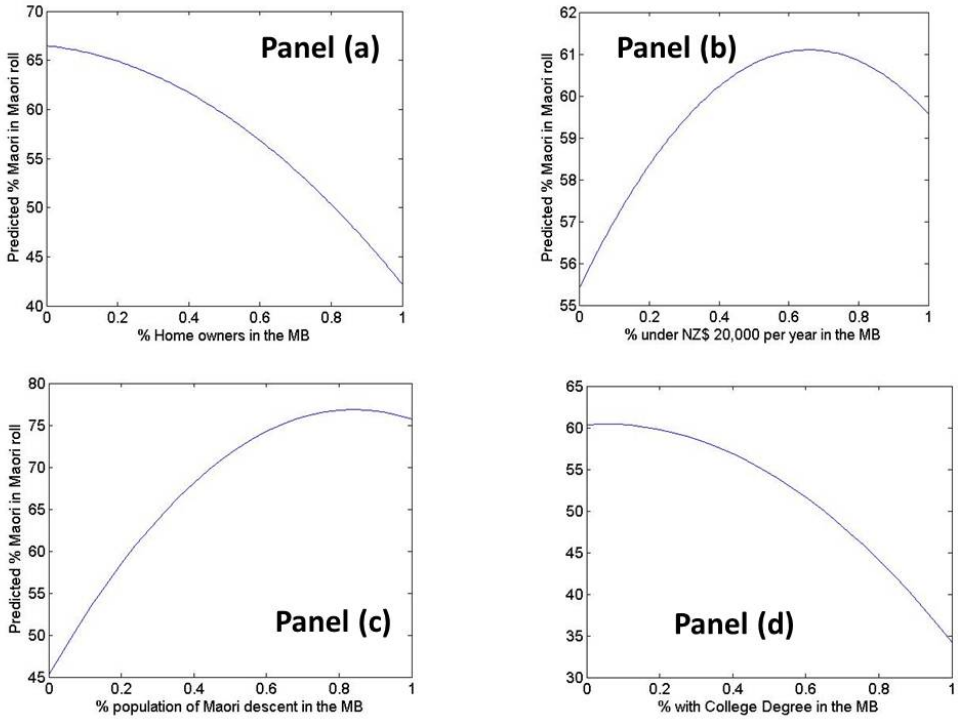

Figure 8: Predicted % of Maori registered in the Maori roll for all possible values of different socioeconomic variables. These predicted values are taken at the mean of the variables, using the value of the parameters estimated from (6) including all squared variables and (# Maori)^3.

6.2 Tables

Table 1: Census (2006). Summary Statistics by meshblock

	Average	St. dev.	Min	Max	Median	# Meshblocks[1]
Population[2]	99	74	0	1,431	90	40,441
Maori Population	9.52	12.26	0	188	6	40,441
% Maori[2]	15.40%	16.97	0%	100%	10%	34,060
% Maori in Maori Roll	47.34%	29.20	0%	100%	50%	35,086
% Female	50.63%	8.16	0%	100%	50%	38,032
% Above 65 years old	12.34%	10.25	0%	100%	10%	33,179
% College degree	13.65%	11.63	0%	86.36%	10.71%	31,618
% Full time employed[3]	49.34%	13.04	0%	100%	50%	35,445
Closeness General Electorate [4]	21.14%	12.94	0.99%	57.64%	21.85%	-
Closeness Maori Electorate [5]	15.38%	6.10	10.34%	29.48%	13.11%	-

Data: Census data downloaded from `http://www.stats.govt.nz/`. A meshblock is the smallest statistical unit. Summary statistics for the 40,441 meshblocks that I can locate in a particular electorate (that is, 99.9% of the population is included).
(1) The last column (Meshblocks) refers to the number of meshblocks for which data is treated as non-missing. Missing data is equivalent to 0.
(2) Usually Resident Population Count
(3) % of total population, not of workforce.
(4) Distance in % of votes between the two most voted parties in the electorate vote in the General Roll in the 2005 elections. The data refers to the electorate the meshblock belongs to (in the 2005 elections there were 69 electorates).
(5) Distance in % of votes between the two most voted parties in the electorate vote in the Maori Roll in the 2005 elections. The data refers to the electorate the meshblock belongs to (in the 2005 elections there were 69 electorates).

Table 2: Electoral Results (2005)

	% Party vote	Electorate seats	Party Seats	Total
Labour	41.1%	31	19	50
National	39.1%	31	17	48
New Zealand First	5.72%	0	7	7
Green	5.30%	0	6	6
Maori	2.12%	4	0	4
United Future	2.67%	1	2	3
ACT	1.51%	1	1	2
Progressive	1.16%	1	0	1

Source: New Zealand Electoral Commission, `http://www.electionresults.govt.nz/`

Table 3: Baseline regression (unweighted): effects of previous electorate results and other sociodemographic variables on registration in the Maori Roll

%MAO	(1)	(2)	(3)	(4)	(5)[1]
Closeness Maori electorate -	-0.006	0.063***	0.063**	-0.102*	-0.044
Closeness general electorate	(0.473)	(0.010)	(0.012)	(0.026)	(0.077)
(Closeness Maori electorate -				0.234***	0.154*
Closeness general electorate)^2				(0.081)	(0.078)
% Maori in electorate		0.531***	0.532 ***	0.531***	0.497***
		(0.017)	(0.033)	(0.032)	(0.036)
% female		-0.013	-0.013	-0.015	-0.030
		(0.033)	(0.036)	(0.036)	(0.034)
% owners		-0.267***	-0.267***	-0.266***	-0.241***
		(0.012)	(0.017)	(0.017)	(0.016)
% unemployed		0.261***	0.261***	0.246***	0.250***
		(0.053)	(0.061)	(0.061)	(0.056)
% NZ$20,000 or less		0.072***	0.072**	0.074***	0.078***
		(0.017)	(0.027)	(0.027)	(0.024)
% college degree		-0.155***	-0.156***	-0.146	-0.111***
		(0.016)	(0.034)	(0.035)	(0.031)
# Maori in the electorate		0.0004 ***	0.0004 ***	0.0004 **	0.007***
		(0.0001)	(0.0002)	(0.0002)	(0.0007)
(# Maori in the electorate)^2					-0.0001***
					(0.00001)
Constant	.473***	0.487***	0.487***	0.493***	0.445***
	(0.001)	(0.023)	(0.034)	(0.036)	(0.034)
Other socioeconomic controls[2]	NO	YES	YES	YES	YES
Clustered standard errors[3]	NO	NO	YES	YES	YES
Prob > F(1, q)[4]	0.42	0.0000	0.0000	0.0000	0.0000
# Maori included	385,204	297,848	297,848	297,848	297,848
% Maori represented[5]	100%	77.32%	77.32%	77.32%	77.32%
R^2	0.000	0.2231	0.2231	0.2238	0.2323
Observations (meshblocks)	35,086	23,537	23,537	23,537	23,537

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Unit of analysis: meshblock. In order to make the analysis of columns (4) and (5) meaningful, all values of (Closeness Maori electorate - Closeness general electorate) are re-scaled to be positive.
%MAO: % of Maori resident in the meshblock who were registered in the Maori roll in 2006.
Closeness electorate = 1 - distance of contention, where distance of contention = share of votes winner - share of votes runner-up in the general electorate in which the meshblock belonged to in 2005.
(1) Also includes (# Maori in the electorate)^3.
Closeness electorate result in Maori roll (2005): same with results of the Maori electorate to which the meshblock belonged to in 2005.
(2) Other controls: % below 30 years of age, % drove a car to work the day of the Census, % not in the labor force.
(3) Clustered at the General electorate level (62 clusters).
(4) q = observations - # parameters
(5) $\frac{\text{\# Maori included in the regression}}{\text{\# Maori of the initial sample of 40,441 meshblocks (385,204)}}$

Table 4: Baseline regression (weighted): effects of previous electorate results and other sociodemographic variables on registration in the Maori Roll. Meshblocks weighted by Maori population.

%MAO	(1)	(2)	(3)	(4)	(5)[1]
Closeness Maori electorate - Closeness general electorate	-0.009 (0.007)	0.081*** (0.007)	0.081*** (0.012)	-0.064 (0.023)	-0.010 (0.067)
(Closeness Maori electorate - Closeness general electorate)^2				0.202** (0.078)	0.131*** (0.032)
% Maori in electorate		0.412*** (0.008)	0.412 *** (0.018)	0.414*** (0.018)	0.366*** (0.020)
% female		-0.010 (0.013)	-0.011 (0.024)	-0.011 (0.024)	0.002 (0.023)
% owners		-0.247*** (0.008)	-0.247*** (0.016)	-0.246*** (0.016)	-0.217*** (0.015)
% unemployed		0.227*** (0.034)	0.228*** (0.060)	0.215*** (0.058)	0.221*** (0.050)
% NZ$20,000 or less		0.033*** (0.013)	0.033 (0.026)	0.034 (0.027)	0.042* (0.022)
% college degree		-0.207*** (0.014)	-0.207*** (0.032)	-0.194*** (0.033)	-0.131*** (0.028)
# Maori in the electorate		0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.005*** (0.0004)
(# Maori in the electorate)^2					-0.000*** (0.0000)
Constant	.576*** (0.001)	0.487*** (0.023)	0.487*** (0.034)	0.531*** (0.034)	0.465*** (0.032)
Other socioeconomic controls[2]	NO	YES	YES	YES	YES
Clustered standard errors[3]	NO	NO	YES	YES	YES
Prob > F(1, q)[4]	0.19	0.0000	0.0000	0.0000	0.0000
# Maori included	385,204	297,848	297,848	297,848	297,848
% Maori represented[5]	100%	77.32%	77.32%	77.32%	77.32%
R^2	0.000	0.3867	0.3867	0.3877	0.4007
Observations (meshblocks)	35,086	23,537	23,537	23,537	23,537

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Unit of analysis: meshblock. In order to make the analysis of columns (4) and (5) meaningful, all values of (Closeness Maori electorate - Closeness general electorate) are re-scaled to be positive.
%MAO: % of Maori resident in the meshblock who were registered in the Maori roll in 2006.
Closeness electorate = 1 - distance of contention, where distance of contention = share of votes winner - share of votes runner-up in the general electorate in which the meshblock belonged to in 2005.
(1) Also includes (# Maori in the electorate)^3.
Closeness electorate result in Maori roll (2005): same with results of the Maori electorate to which the meshblock belonged to in 2005.
(2) Other controls: % below 30 years of age, % drove a car to work the day of the Census, % not in the labor force.
(3) Clustered at the General electorate level (62 clusters).
(4) q = observations - # parameters
(5) $\frac{\text{\# Maori included in the regression}}{\text{\# Maori of the initial sample of 40,441 meshblocks (385,204)}}$

6.3 How Electorates are created

To be filled

6.4 Sainte-Laguë Electoral Formula

The Sainte-Laguë formula works in quotients. At each round, a quotient is computed for all parties contending for seats. At each round, the party with the highest quotient is allocated the seat. There are as many rounds as seats in parliament to be distributed (i.e. 120 for the case of New Zealand). For each party the quotient is computed as follows:

$$QUOTIENT = \frac{\#\text{ Votes}}{2s+1}$$

where s is the number of seats allocated to that party in the previous rounds. For the curious reader, the D'Hondt formula is the same, but with (s+1) in the denominator.

6.5 Estimation of $g(.)$ in expression (5)

The estimation strategy is based on Härdle et al. (2000). The model is

$$Y_i = X_i\beta + g\left(DIFF_i\right) + \varepsilon_i \tag{9}$$

where Y = %MAO. I first select the number of gridpoints (J). If the number is, say, 41, this means that I calculate the value of $g\left(DIFF\right)$ at $DIFF = [-1, -0.95, -0.9, ..., 0, ..., 0.95, 1]$. Let ν be a particular set of gridpoints chosen, $\nu = [\nu_1, \nu_2, ..., \nu_J]$.

Next I specify how I estimate $g\left(\nu_j\right)$ for a given gridpoint ν_j. I assume that all the observations are normally distributed around ν_j, following a Normal distribution with mean ν_j and variance σ. As with the number of gridpoints, I let the variance change in order to have more robust results.

The assumption of normality is critical in order to give weights to the different observations. The weight ω_i of each particular observation is given by its distance to the particular gridpoint ν_j. The particular specification I choose is:

$$\begin{aligned}
&\omega_i(\nu_j) = \phi_i(DIFF_i), \quad \text{where} \\
&\phi_i = \text{ p.d.f. of a Normal with mean } \nu_j \text{ and variance } \sigma \\
&\text{and of course} \sum_i \omega_i(\nu_j) = 1
\end{aligned}$$

so the closer $DIFF_i$ is to ν_j, the larger the weight of observation i. Then I estimate $\hat{\beta}_{LS}$, which is given by:

$$\hat{\beta}_{LS} = \left(\tilde{X}'\tilde{X}\right)^{-1}\tilde{X}'\tilde{Y}, \quad \text{where}$$
$$\tilde{X}_i = X_i - \sum_{j=1}^{N}\omega_j X_j, \quad \tilde{Y}_i = Y_i - \sum_{j=1}^{N}\omega_j Y_j$$

Finally, one can estimate the value of g at ν_j by computing the following:

$$g\left(\nu_j\right) = \sum_{i=1}^{N}\omega_i\left(Y_i - X_i'\hat{\beta}_{LS}\right) \tag{10}$$

Once I have all J values of $g\left(\nu_j\right)$, I plot them in a graph, as shown in Figures 4 and 5.

In the weighted regression, the weights are given by

$$\omega_i(\nu_j) = \frac{\#\text{ Maori in the meshblock}}{\text{Total }\#\text{ of Maori}} \times \phi_i(DIFF_i), \quad \text{where}$$
$$\phi_i = \text{ p.d.f. of a Normal with mean } \nu_j \text{ and variance } \sigma$$
$$\text{and of course} \sum_i \omega_i(\nu_j) = 1$$