Appendices:
Positioning Under Alternative Electoral Systems: Evidence From Japanese Candidate Election Manifestos

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Appendix A: Major Parties in the Sample

As the paper explains, we estimated the positions of "non-frivolous candidates", meaning those who captured at least 10,000 votes in their districts or who were endorsed by one of the major parties fielding candidates in these eight elections. The list of the parties defined as "major" are below. Note that in our test of Hypothesis 2, we used this list to calculate our estimates of within-party dispersion. In 1986: the LDP, JCP, SDP, Komeito, DSP, SDL, and NLC; in 1990: LDP, JCP, SDP, Komeito, DSP, SDL, and Progressives; in 1993: LDP, JCP, SDP, Komeito, DSP, SDL, Sakigake, Japan New Party (JNP), and Shinseito; in 1996: LDP, DPJ, NFP, JCP, SDP, New Socialist Party, and Sakigake; 2000: LDP, DPJ, JCP, SDP, Conservatives, Liberals, and Komeito; 2003: LDP, DPJ, SDP, JCP, Komeito, and Conservatives; 2005: LDP, DPJ, Komeito, SDP, JCP, People's New Party (PNP), and New Party Japan; and 2009: LDP, DPJ, Komeito, SDP, JCP, PNP, and Your Party.

Appendix B: Candidate Positions (Supplementary)

We estimated candidate positions by applying the quantitative scaling model Wordfish (Slapin and Proksch, 2008) to our corpus of 7,497 Japanese-language candidate election manifestos. As we explained in the paper, candidates are allowed to write whatever they like, in whatever size font they like, in whatever style they like, in the form provided to them by their local electoral commissions.

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The only restrictions on content are a ban on false statements and the use of a manifesto for commercial purposes. The commissions are required to distribute the manifestos exactly as they were written by the candidate, with no changes to length, style, or font size, to all registered voters in the district at least two days before an election.

We obtained the corpus of manifestos in microfilm from Japan's National Diet Library, after arranging for them to be scanned from their original (newspaper) format. However, we found it virtually impossible to extract machine-readable Japanese text. Japanese has thousands of characters, three scripts (kanji, hiragana, and katakana), and allows one to write sentences the English way (starting from the top left, moving right and then down) or the Japanese way (starting from the top right, moving down and then left). In addition, some of the manifestos contained sections that were hand-written. None of the optical character recognition (OCR) software we tried were able to extract machine-readable text. We are deeply indebted to Yutaka Shinada for allowing us to use his large collection of machine-readable manifestos, which were painstakingly assembled and transcribed by him and his research team over a a long period. We transcribed a small number of manifestos ourselves and added those to his collection. Because Shinada was interested in the candidate's policy promises, as we are in this project, he excluded sections of the manifesto that were entitled "Profile" or "Biography", which were usually a resume of personal accomplishments (sometimes including a candidate's height, weight, and blood type) and those headed with "Endorsements", which was typically a list of the names of people in the community.

As input, Wordfish takes a term-document matrix (TDM) created from all the documents in a corpus, in which the rows are comprised of words, the columns are comprised of document identifiers, and the cells are comprised of the frequencies with which words appear in documents. To create a TDM, we needed a means of parsing out the Japanese text; in effect, of inserting spaces between words. We used the tokenizer MeCab, developed by researchers at the Nara Institute of Science and Technology and implemented in the R programming language by Ishida (2010).[1] MeCab is a morphological language analysis tool that separates Japanese text into words according to a phonetic alphabet part-of-speech dictionary, which was developed by Japan's Information Technology Promotion Agency. In one step, MeCab can parse out the Japanese text, classify each word according to

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[1] For MeCab, see http://mecab.sourceforge.net/. For RMeCab, see http://rmecab.jp/wiki/index.php?RMeCab.

its part-of-speech, and reduce words to their stems.

In preparing our election-specific TDMs, we followed the guidelines in the manual written by the creators of Wordfish, adjusting for the fact that the manifestos are written in Japanese (Proksch and Slapin, 2009). To summarize, the manual recommends stemming the words, removing punctuation, capitalization, and numbers, reducing the size of the TDM using rules such as the frequency with which words appear in documents, and ensuring that the spelling of words is consistent across documents. Using RMeCab, we read in the manifestos pertaining to each election, parsing out the text and stemming the words at the same time. We used its part-of-speech classifier to eliminate words that fulfill a purely grammatical function (words defined as "functional"). MeCab classifies words into one of 13 mutually-exclusive categories, each of which serves as an umbrella category for a large number of sub-categories.[2] For example, MeCab recognizes 31 types of noun and 34 types of verb. We decided to keep words classified as adjectives, verbs, adverbs, and nouns (with the exception of nouns that fell into the sub-categories of pronouns, noun-affixes, and numbers) and eliminated the rest. After creating our election-specific TDMs, we eliminated words that appeared in less than 0.5% of the manifestos in that election. This is identical or similar to the thresholds employed by other political scientists working with text (e.g. Spirling, 2011; Hopkins and King, 2010; Quinn et al., 2010; Grimmer, 2009).[3]

The problem of words being spelled differently or not being in the same case (lower or upper) across documents presents a larger problem when working with text in Japanese. This is because authors have a certain amount of flexibility over which of the three scripts they use to write each word. The same word can appear in a document in all three scripts, and each scriptive representation has the same meaning. This flexibility extends to the different *combinations of scripts* that can be used to write different *parts of each word*. For example, the word *furusato* means hometown. This word appeared in four different ways in the manifestos: the entire word could be written in kanji; the entire word could be written in hiragana; the first two syllables could be written in kanji and the second two in hiragana; and the opposite. Peculiarly, scriptive flexibility also extends to the way English-language words can be rendered in Japanese and appeared in the manifestos. In addition to

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[2]The 13 categories are nouns, prefixes, verbs, adjectives, adverbs, adnominals, conjunctions, particles, auxiliary verbs, interjections, symbols, fillers, and other.

[3]The fact that we had eliminated functional words in the previous step meant that no words appeared in more than 99% of the documents, which is the second typically-employed threshold.

standard differences in capitalization, English words can be written in "half-width" or "full-width". While software such as Kakashi can convert all Japanese words to their hiragana syllables, this would pose challenges on the interpretation end because it would render numerous pairs of words identical, their different meanings having been conveyed with different kanji, which would be lost. To deal with this, we combined our eight election-specific TDMs into one large TDM. From the unique words in this TDM, we compiled a list of words that appeared throughout the manifestos in different scriptive representations, either in Japanese or English. We selected a single scriptive representation for each and converted all representations of that word to this representation.

To our knowledge, there is no widely-agreed upon list of Japanese-language stop words. Using this combined TDM, we created our own list. Our list contained many words whose English-language equivalents are part of the list of stop words contained in the Snowball stemmer, such as "after", "again", "further", and "make". In our list, we also included English-language words such as "http", "homepage", "www", "office", and "QR code", which signaled the candidate had included information about how to obtain further information about her candidacy. To reduce the size of this TDM further, we eliminated words that appeared in less than 0.5% of the 7,497 manifestos. This left us with a TDM of 2,830 unique words. Finally, we re-created our eight election-specific TDMs from this large TDM and ran Wordfish on each using the package "austin" (Lowe, 2014). The election-specific TDMs varied slightly in the number of unique words they contained. The number of words was 2,298 in 1986 (n=800 manifestos), 2,406 in 1990 (n=854), 2,379 in 1993 (n=866), 2,396 in 1996 (n=1,126), 2,296 in 2000 (n=1,070), 2,253 in 2003 (n=994), 2,212 in 2005 (n=966), and 2,059 in 2009 (n=821).

Because candidates can include photos, slogans, and vary the size of the font used, the number of words in a manifesto varies. Excluding punctuation and numbers, we found that in 1986, the median manifesto contained 471 words (353 words was the lower quartile and 617 words was the upper quartile of the distribution). In 1990, the median manifesto contained 452 words (337 words was the lower quartile and 594 words was the upper quartile). In 1993, the median manifesto contained 436 words (318 words was the lower quartile and 566 words was the upper quartile). In 1996, the median manifesto contained 404 words (294 words was the lower quartile and 521 words was the upper quartile). In 2000, the median manifesto contained 373 words (272 words was the lower quartile and 481 words was the upper quartile). In 2003, the median manifesto contained 331 words (241

words was the lower quartile and 429 words was the upper quartile). In 2005, the median manifesto contained 347 words (250 words was the lower quartile and 476 words was the upper quartile). In 2009, the median manifesto contained 267 words (11 words was the lower quartile and 348 words was the upper quartile).

We also calculated summary statistics from the eight election-specific TDMs we used to run Wordfish. As we explained above, these TDMs do not contain function words, stop words, and uncommon words. Figure 1 and 2 present summary statistics of the distribution of number of words in a manifesto by party-year. As Figure 1 shows, the median manifesto (after pre-processing) contains 195 words in 1986, 183 words in 1990, 182 words in 1993, 177 words in 1996, 166 words in 2000, 152 words in 2003, 154 words in 2005, and 160 words in 2009. Figure 2 plots the distribution of number of words in a manifesto by party-year for all major parties listed above. In each election, parties are sorted from those whose candidates wrote the shortest manifestos to those whose candidates wrote the longest manifestos. The lines around the dots represent their 95% confidence intervals. Immediately, we can see that candidates from certain small parties (e.g. Social Democratic League, Progressives, New Liberal Club, Sakigake, Democratic Socialist Party, New Party Japan, and Your Party) have considerable variation in word length. We can also see that the longest manifestos tend to be written by LDP and JCP candidates.

As we explained in the paper, Wordfish locates documents on a uni-dimensional scale (meaning that it assigns them a number, whose minimum and maximum can vary), and it is up to the researcher to ascertain which end constitutes the ideological left and right, respectively. Following Proksch, Slapin and Thies (2011), who used Wordfish to model ideological competition among parties in Japan with statements made by their leaders, we reasoned that the average Japan Communist Party (JCP) candidate would have always been located to the ideological *left* of the average Liberal Democratic Party (LDP) candidate. Using this rule, we found that *lower numbers* constituted the *ideological right* in the 1986, 1993, 2000, 2005, and 2009 elections, and the *ideological left* in the 1990, 1996, and 2003 elections. For ease of interpretation, we multiplied the scales by -1 in the 1986, 1993, 2000, 2005, and 2009 elections so that lower numbers constitute the ideological left in all elections. Figure 3 plots histograms of the distribution of candidate positions in each of the eight elections. In all elections, some candidates located themselves on the left (smaller numbers) and some located themselves on
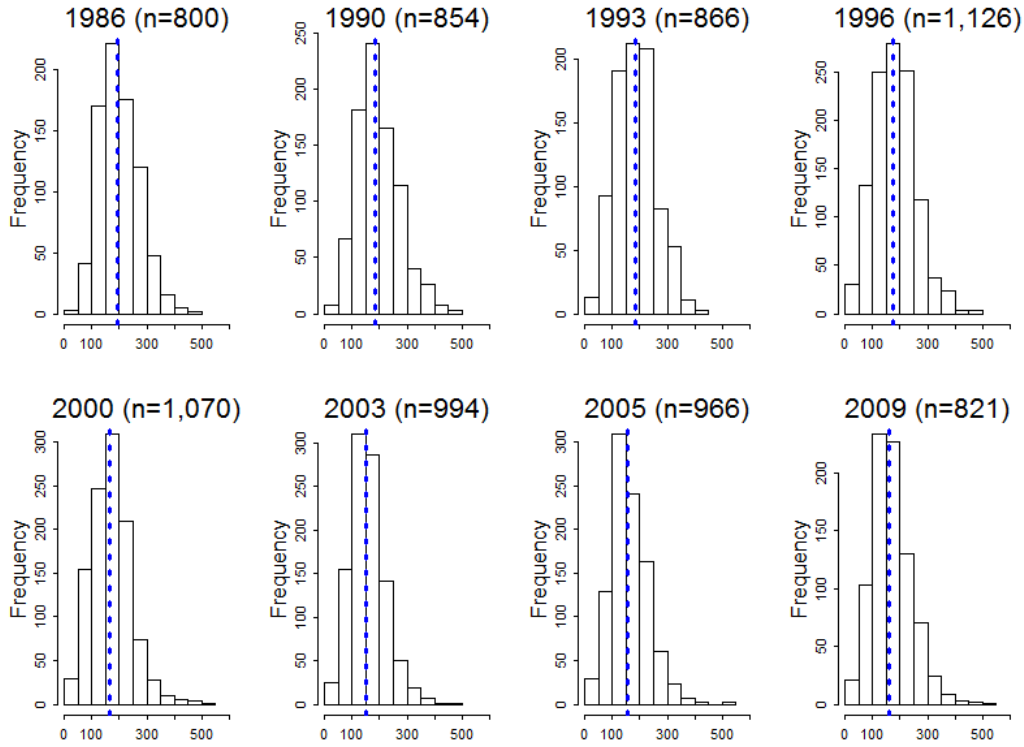
Figure 1: The distribution of number of words in manifestos produced by candidates in elections to Japan's House of Representatives (HOR), 1986-2009. The blue dotted lines depict the median number of words in a manifesto for each election.

the right (larger numbers).

As the paper explains, we used several strategies to validate the positions recovered by the model. One of these was to examine their correlation with positions candidates reported in the two waves of the Asahi-Todai Elite Survey (ATES) in which candidates were asked to locate themselves on a left-right spectrum.[4] Figure 4 depicts these correlations. Another validation strategy was to examine the model's word weights and word fixed effects. Words that are used frequently by candidates, and thus are unlikely to distinguish between positions, should have large fixed effects and word weights that are close to zero. Words that are used infrequently are more likely to distinguish between positions and should have small fixed effects and word weights that are either large or small, depending on their location on the left or right. We plotted the word fixed effects against the word weights for each election and found that the shape of the plot resembled an "Eiffel tower of words", in which words with high fixed effects tended to have word weights close to zero and words with low or high word

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[4]The ATES was conducted by Masaki Taniguchi and is available at www.j.u-tokyo.ac.jp/~masaki/ats/atsindex.html.
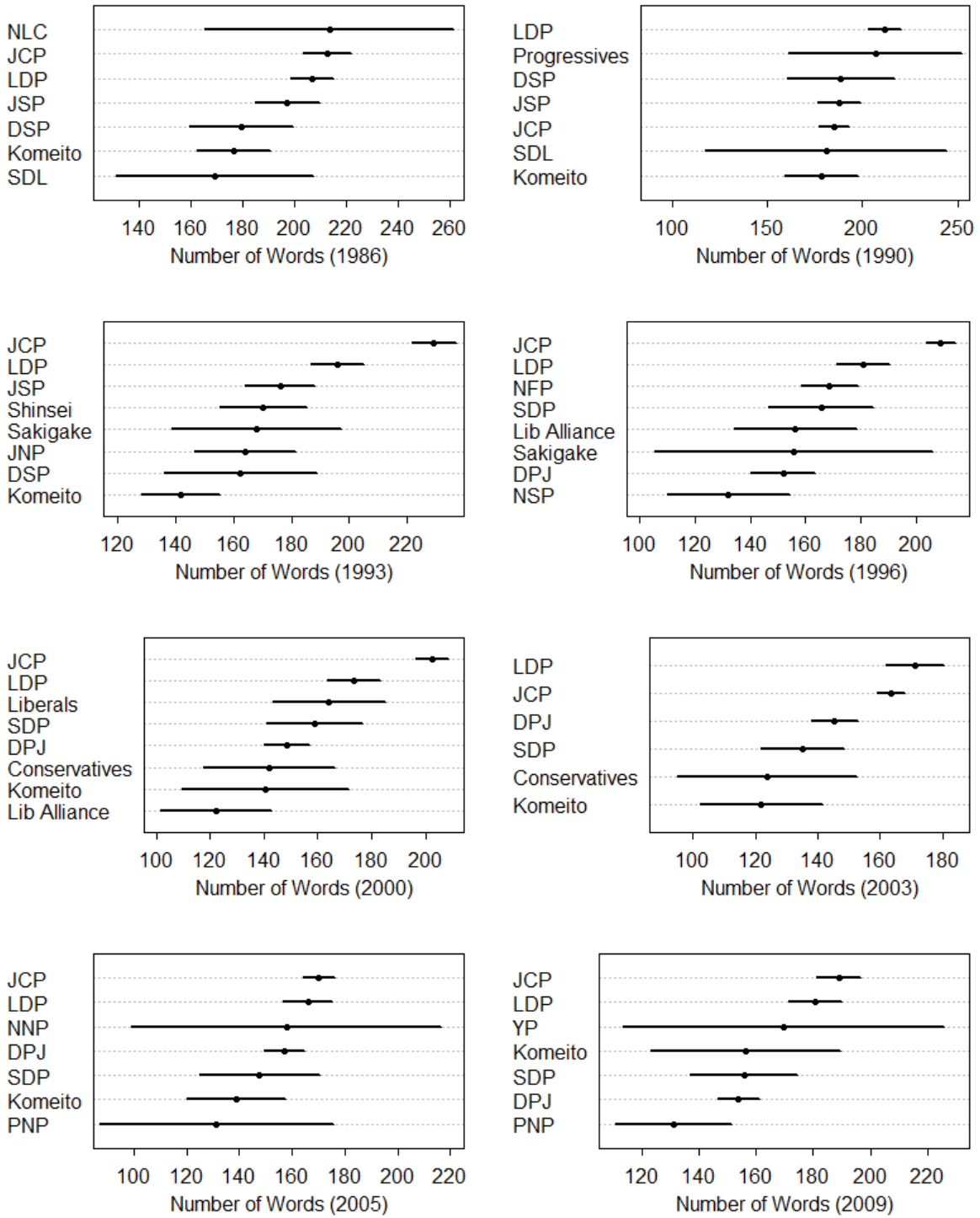
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Figure 2: This plots the number of words in the manifesto of the average candidate of each of the major parties that contested the eight HOR elections between 1986 and 2009. The lines around the dots represent their 95% confidence intervals.

weights tended to have low fixed effects (Proksch and Slapin, 2010).

Words estimated to have high fixed effects (meaning they are used by all candidates) include:
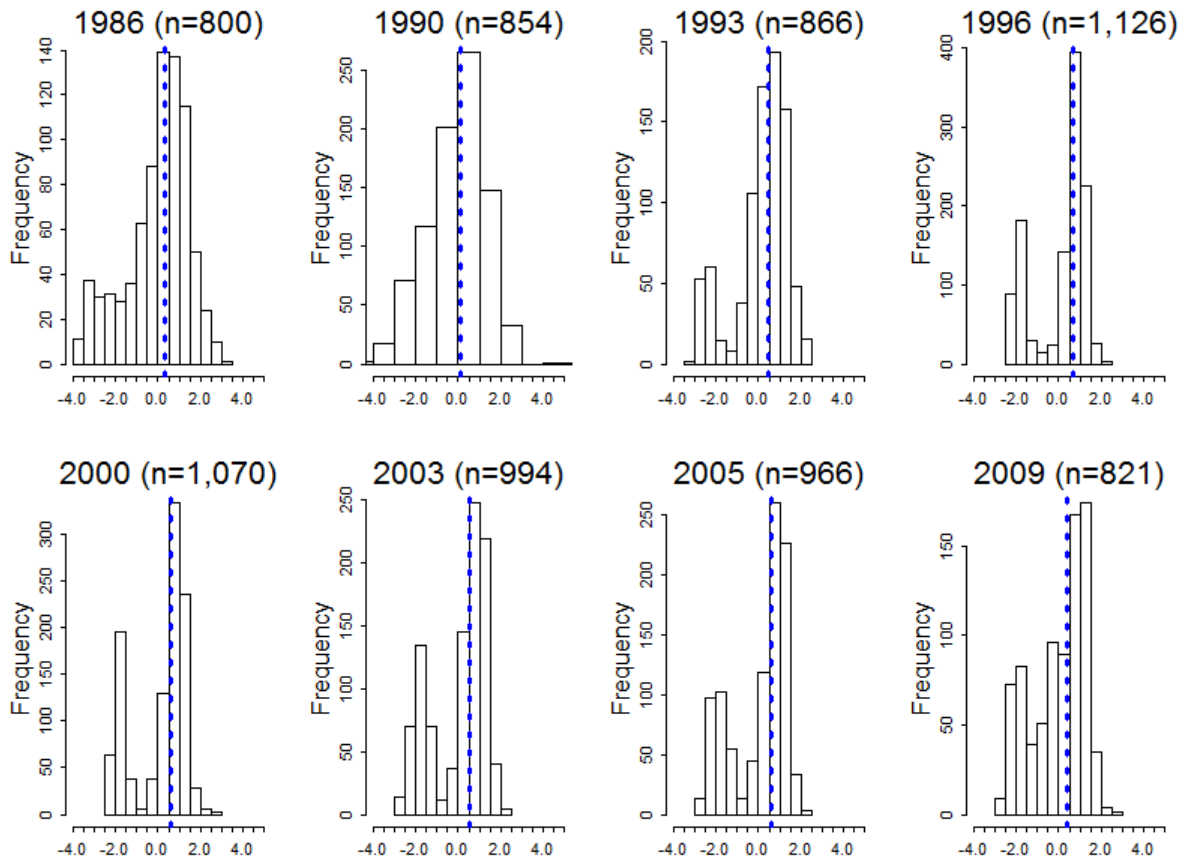
Figure 3: The distribution of estimates of ideological positions adopted by candidates in elections to Japan's House of Representatives (HOR), 1986-2009. Smaller numbers indicate the ideological left. The blue dotted lines depict the median position.

politics, society, tax, education, Japan, yen, reform, welfare, implement, consume and health care. Words estimated to have low fixed effects and weights that indicate a location on the *left* include: bad government, fake, throw away, conspiracy, the people, damaging, plotting, militarization, undercut, protect, unconditional, quota, tab (as in "pick up the tab"), and main character. Words estimated to have low fixed effects and weights that indicate a location on the *right* include: profit, revenue, national interest, challenge, mayor, parents, Ministry of Finance, construct, salary, decent, obligation, faction, augment, countryside, mutual, chief, and one's true feelings. These words, combined with our reading of manifestos located at the extremes, indicate that the dimension is one of *support versus opposition to the establishment.*
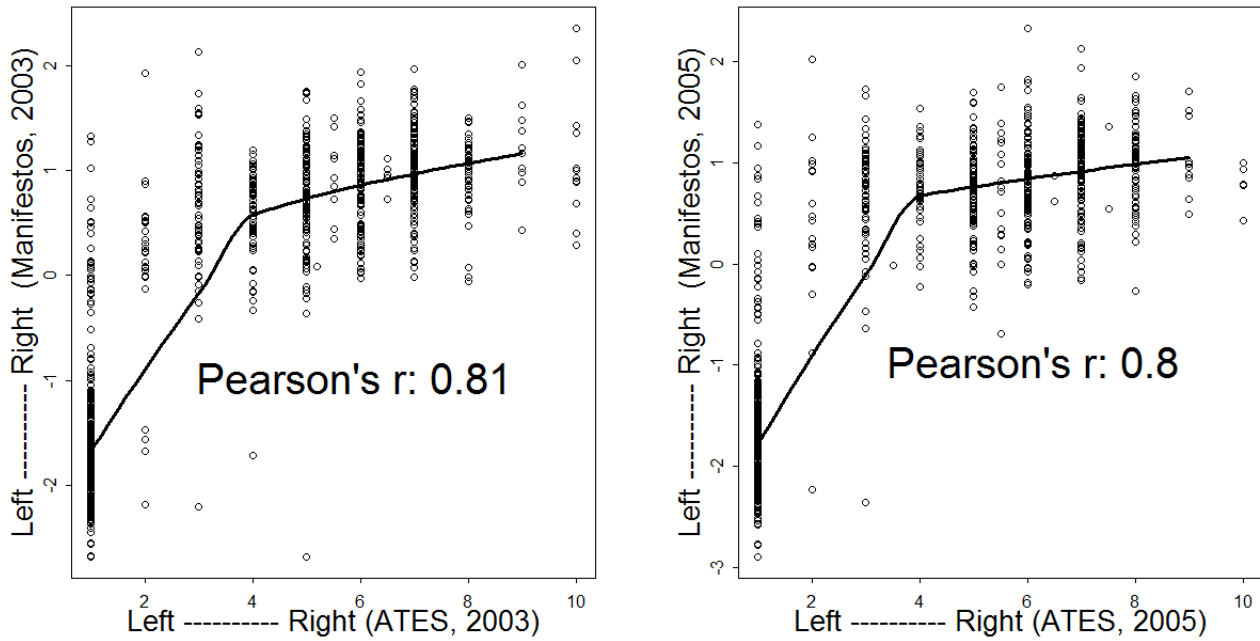
Figure 4: Correlation between candidate positions estimated with their manifestos in 2003 and 2005 and the positions candidates reported in surveys in those same elections.

Appendix C: Results: Dispersion in Districts (Supplementary Information)

Analysis of Means

To test Hypothesis 1, the paper first calculates dispersion in candidate positions in all districts in all elections using all candidates prior to electoral reform and candidates from majority-seeking parties after reform and reports the mean within-district dispersion in each election. Focusing on large party candidates under the new system results in fewer than the universe of 300 districts because districts in which there was a single candidate in this category drop out. In this and the subsequent test of Hypothesis 1, we also dropped the single district with an M of 1 in 1986 and 1990; the two districts in 1996 and 2005 in which one of the "non-frivolous" candidates did not produce a manifesto; and the district in 1996 in which a candidate had been mis-coded in the elections data.

Figure 5 plots these means, with the vertical bars indicating 95% confidence intervals. While there were statistically-significant changes in mean district-level dispersion between 1986 and 1990,

2000 and 2003, and 2005 and 2009, respectively, the decline in mean district-level dispersion between 1993 and 1996 was much greater. The 2009 election has a mean district-level dispersion that is larger than other elections under the new system but still smaller than elections under the old system. As expected, a difference in means test between the mean dispersion in positions in an MMD under the old system (2.07, n=387 districts) and the mean dispersion in positions in an SMD under the new system (0.46, n=1,268) was statistically significant, with a p-value of <0.001. Similarly, a difference in means test between the mean dispersion in positions in an MMD in 1993 (1.87, n=129 districts) and the mean dispersion in positions in an SMD in 1996 (0.14, n=254) was also statistically significant, with a p-value of <0.001.[5]
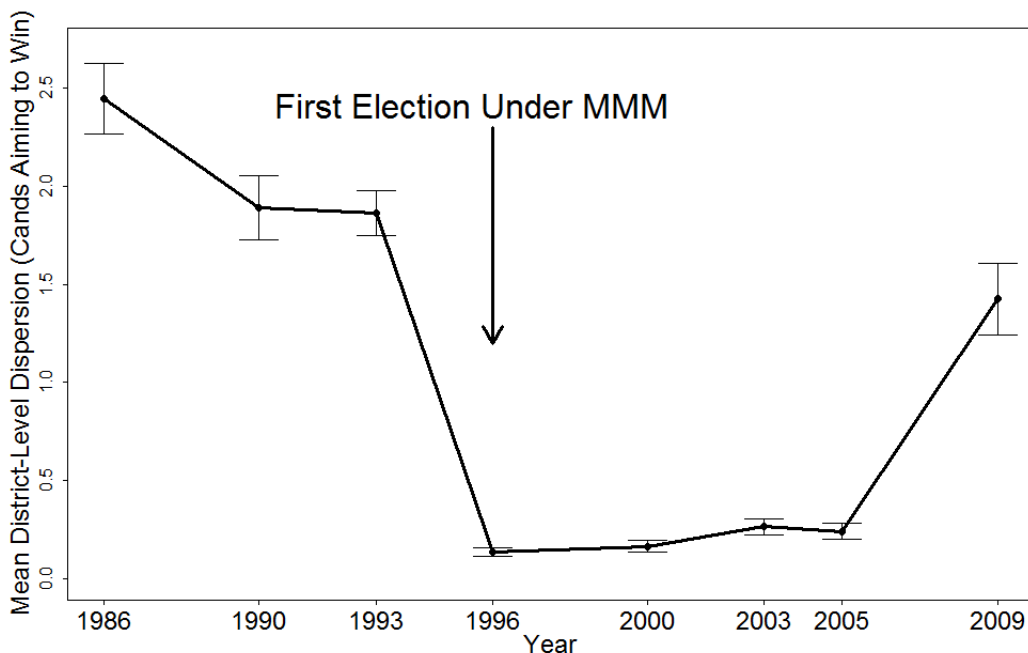

Figure 5: The dispersion of positions among candidates in the average district in the eight HOR elections between 1986 and 2009 using all candidates prior to electoral reform and candidates from large parties after electoral reform. This figure was created by calculating the variance in candidate positions in each district in each election using these candidates, and then taking the mean of these variances. The means are plotted, with the vertical lines indicating their 95% confidence intervals. As expected, electoral reform is associated with a decline in dispersion.

The paper also conducts a robustness test, in which dispersion in positions among candidates in a

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[5]The decline in variance between 1993 and 1996 is especially notable because 111 SMDs in the 1996 election contained candidates from *three* majority-seeking parties. Importantly, we found no statistically-distinguishable difference in variance between SMDs in which candidates from *two* majority-seeking parties ran (0.15, n= 145) and SMDs in which candidates from *three* majority-seeking parties ran (0.13, n=111).

district is recalculated using candidates under the old system who had been one of the top $M+1$ vote-getters in the same district in the previous election. This results in slightly fewer districts because districts containing a single competitive candidate drop out. The mean within-district dispersion was *lower* when recalculated using competitive candidates, but still higher than within-district dispersion in the first four elections under the new system. Figure 6 plots these means, with the vertical bars representing their 95% confidence intervals. A difference in means test between the mean dispersion in candidate positions in an MMD under the old system using only competitive candidates (1.26, n=384 districts) and the mean dispersion in positions in an SMD under the new system using only candidates from the LDP, DPJ, and NFP (0.46, n=1,268 districts) was statistically significant, with a p-value of <0.001. Similarly, a difference in means test between the mean dispersion in an MMD in 1993 (0.87, n=128 districts) and the mean dispersion in an SMD in 1996 (0.14, n=254 districts) was also statistically significant, with a p-value of <0.0001.
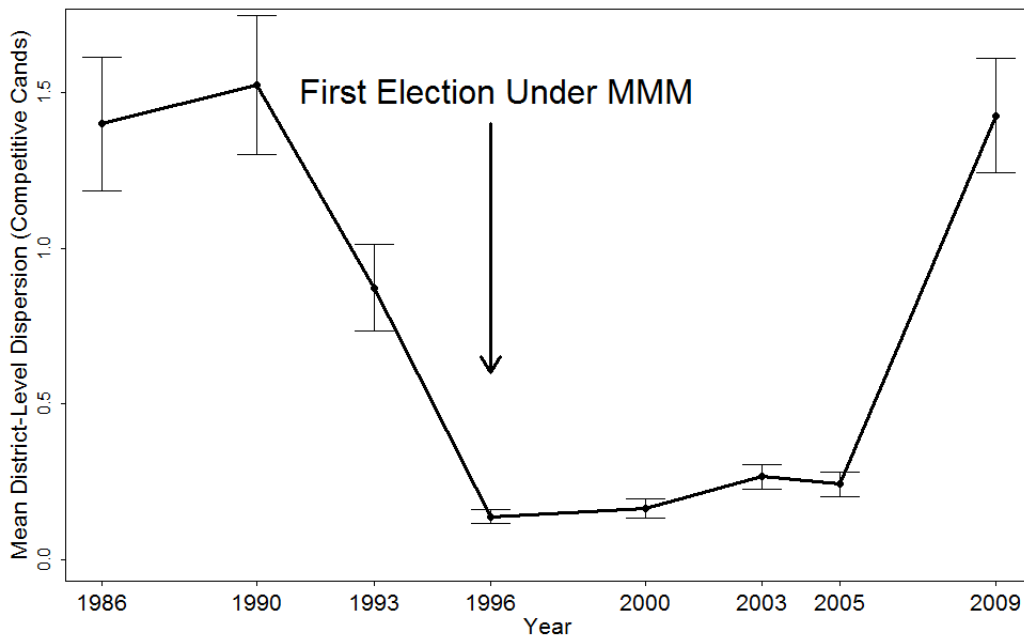

Figure 6: The dispersion of positions among candidates in the average district to the eight HOR elections between 1986 and 2009 using competitive candidates prior to reform and candidates from large parties after reform, 1986-2009. This figure was created by calculating the variance in positions in each district in each election using competitive candidates under the old system and candidates from large parties under the new, and then taking the mean of these variances. The means are plotted, with the vertical lines indicating their 95% confidence intervals. Electoral reform is still associated with a decline in dispersion, with the exception of 2009.

Regression-related

After reporting the means, the paper moves onto regressions to test for the presence of a structural break. Because electoral reform entailed the drawing of new district boundaries, the same district does not exist in both electoral systems. Instead, we have repeated observations of almost all the districts under the old system and then repeated observations of some of the new districts under the new system. A large-scale redistricting occurred between 2000 and 2003, which means that many districts that existed in the 1996 and 2000 elections did not exist in the 2003, 2005, and 2009 elections, and vice versa. In the regressions we used to test for a structural break, we created district fixed effects from the universe of *electoral system-specific districts* in the data.

In all four models in the paper's Table 1, increases in time were associated with lower levels of within-district dispersion under the old system and higher levels under the new. Given that the dimension is support versus opposition to the establishment, the downward trend in dispersion from 1986 until 1993 means that candidates grew *closer together* in terms of the amount of change to the establishment they felt was necessary, and the upward trend from 1996 until 2005 means that candidates moved *further apart* on this dimension. The paper's discussion of alternative explanations provides substantive examples that suggest it may have been due to the rise of political reform: as more conservative candidates addressed the issue and accepted a modicum of reform in 1990 and 1993 relative to 1986, within-district dispersion declined. After electoral reform, it may have been more straightforward for large party candidates to converge on the need for central government reform and reform of the bureaucracy, which they did in 1996, than on reforms that benefited the median voter at the expense of groups that had played a role in vote mobilization, such as farmers and special postmasters. While further analysis is needed, this may explain why within-district dispersion increased over this period.

Predicted Values

The paper's Figure 2 presented predicted values of our dependent variable, within-district dispersion, with 95% confidence intervals. The figure on the left in the paper used all candidates prior to reform, while the figure on the right was a robustness test, restricted to competitive candidates prior to the

reform. These figures were based on a regression that excluded fixed effects for prefecture and district. Figure 7 presents the same two figures drawn with the specification that includes the fixed effects. In this regression, the baseline categories were set to "Aichi" prefecture and "Hokkaido's District 1", which existed under the old electoral system. Electoral reform is associated with a decline in dispersion, with the exception of 2009.
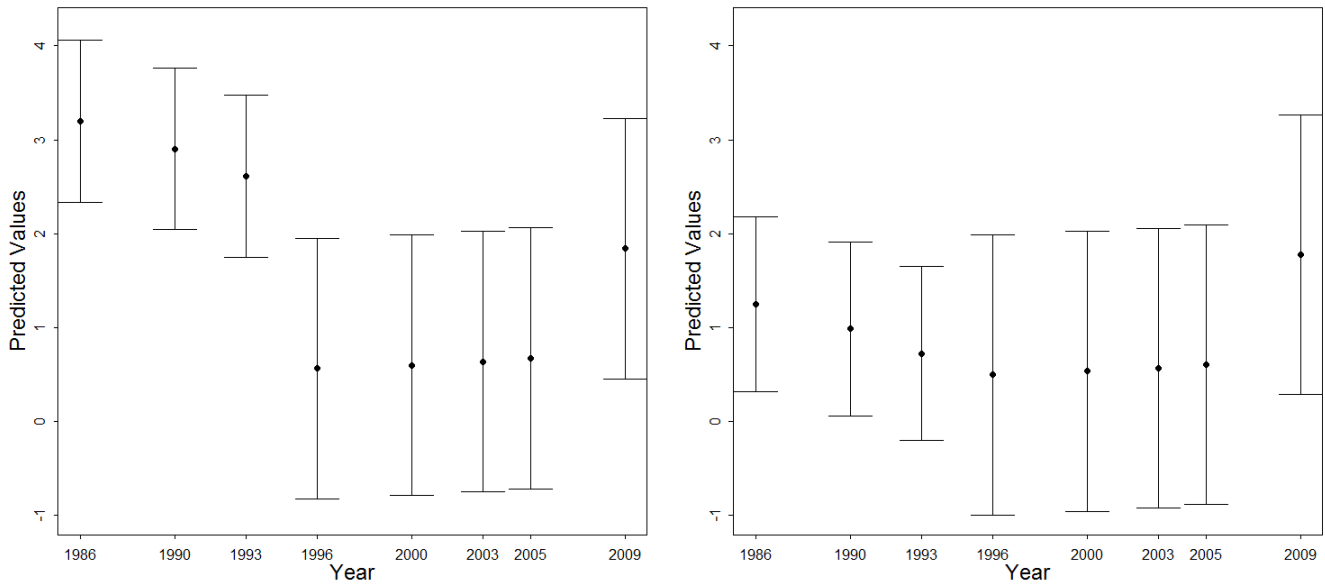

Figure 7: Plot of predicted values of our dependent variable, within-district dispersion, with their 95% confidence intervals across the eight HOR elections. In the left figure, dispersion is calculated with all candidates under the old system. In the right figure, dispersion is calculated with only competitive candidates under the old system. Electoral reform is associated with less dispersion after reform, with the exception of 2009.

Alternative Test

As the paper notes, an alternative means of testing Hypothesis 1 is to use absolute distances between the positions of pairs of candidates. We ranked the candidates competing in all districts in all elections from highest to lowest vote-getter. Then, we calculated the absolute distance between the positions of the top two vote-getters, $D_{1,2}$. If Hypothesis 1 is correct, then the variance in $D_{1,2}$ will be higher under the old electoral system. This is because districts had *different M* under the old system (of between 2 and 6) and *identical M* under the new (of 1). After calculating $D_{1,2}$ for all 1,883 district-years, we found that the mean variance in $D_{1,2}$ in MMDs under SNTV-MMD was 0.88

(n=387 districts) and the mean variance in $D_{1,2}$ in SMDs under MMM was 0.50 (n=1,496 districts).
In other words, the absolute distances between the positions of the top two vote-getters in a district
exhibited less variation under the new system, where M is identical across districts, than under the
old system, where it varied. An F test for equality of variances revealed that we can reject the null
hypothesis that the variances of the two groups are equal (p-value of <0.001).

We also calculated the absolute distances between the positions of the Mth and $M+1$th vote-
getters in all districts in all elections ($D_{m,m+1}$). If Hypothesis 1 is correct, we ought to observe M
exerting a positive, significant impact on both $D_{1,2}$ and $D_{m,m+1}$. We ran linear regressions with $D_{1,2}$
and $D_{m,m+1}$ as the dependent variables and M as the independent variable. We included fixed effects
for prefecture. Table 1 presents the results. In Models 1 and 2, the dependent variable is $D_{1,2}$, with
Model 2 including prefecture fixed effects. In Models 3 and 4, the dependent variable is $D_{m,m+1}$,
with Model 4 including prefecture fixed effects. In all four models, M is found to exert a positive,
significant effect on these absolute distances. Controlling for prefecture, a one-unit increase in M is
associated with a 0.11 increase in $D_{1,2}$ (Model 2) and a 0.16 increase in $D_{m,m+1}$ (Model 4).

Table 1: Estimates from a regression of M (district magnitude) on the absolute distances between
the positions of the top two vote-getters in each district ($D_{1,2}$) (Models 1 and 2) and the positions
of the Mth and $M+1$th vote-getters ($D_{m,m+1}$) (Models 3 and 4), respectively, in all districts in
HOR elections, 1986-2009. Models 2 and 4 contain prefecture-level fixed effects. As expected, M
has a positive, significant effect on $D_{1,2}$ and $D_{m,m+1}$.

	Model 1 ($D_{1,2}$)	Model 2 (+ controls)	Model 3 ($D_{m,m+1}$)	Model 4 (+ controls)
(Intercept)	0.65***	0.61***	0.60***	0.54***
	(0.03)	(0.08)	(0.03)	(0.07)
M	0.11***	0.11***	0.17***	0.16***
	(0.02)	(0.02)	(0.02)	(0.02)
Prefecture fixed effects		✓		✓
N	1883	1883	1883	1883
R^2	0.03	0.07	0.07	0.10
Adj. R^2	0.03	0.05	0.07	0.08

Standard errors clustered by district are in parentheses.
[†] significant at $^*p < .05$; $^{**}p < .01$; $^{***}p < .001$

Appendix D: Results: Dispersion in Parties (Supplementary Information)

Analysis of Means

To test Hypothesis 2, the paper first calculates the dispersion in positions among candidates of the same party for virtually all the parties that fielded candidates in these eight elections. The mean within-party dispersion was 0.54 in 1986 (n=7 parties), 0.81 in 1990 (n=7), 0.28 in 1993 (n=9), 0.13 in 1996 (n=7), 0.14 in 2000 (n=7), 0.13 in 2003 (n=6), 0.16 in 2005 (n=7), and 0.25 in 2009 (n=7). Figure 8 plots these means, with the vertical bars representing their 95% confidence intervals. As expected, a difference in means test between the mean dispersion in candidate positions by party under the old system (0.52, n=23 party-years) and the mean disperson in candidate positions by party under the new system (0.16, n=34) was statistically significant, with a p-value of <0.001. Similarly, a difference in means test between the mean dispersion in candidate positions by party in 1993 (0.28, n=9 parties) and the mean dispersion in candidate positions by party in 1996 (0.13, n=7) was also statistically significant, with a p-value of <0.02. Figure 8 also demonstrates that there was a statistically-significant difference in mean party-level dispersion between 1990 (0.81, n=7 parties) and 1993 (0.28, n=9), and the mean party-level dispersion in 2009 was not statistically-distinguishable from the mean party-level dispersion in 1993.

Regression Results

After reporting mean differences, the paper moves onto regressions to test for the presence of a structural break. Table 2 present the regression results, with and without party fixed effects, with standard errors clustered by party. The dependent variable is within-party dispersion calculated using all parties who fielded candidates. In both models, the coefficients on electoral reform and electoral reform $\times$ t are significant.
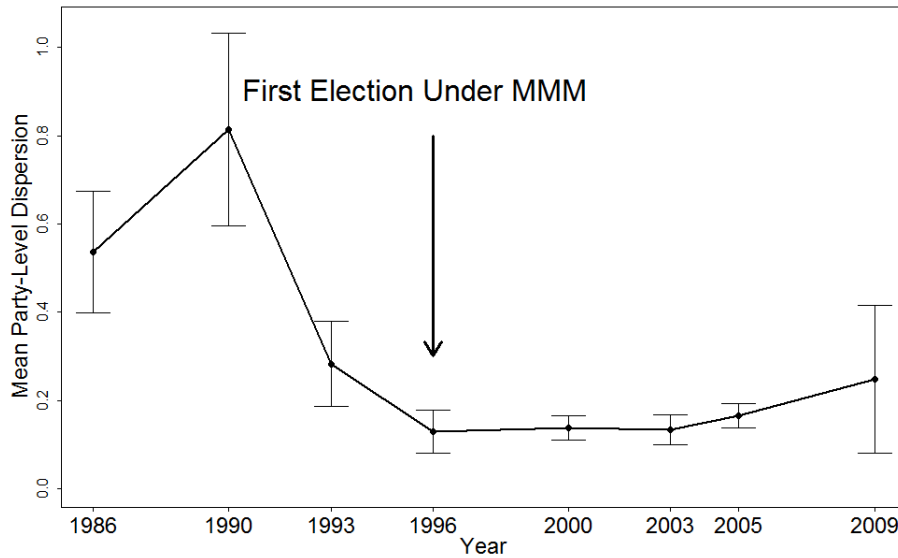
Figure 8: The dispersion of positions among candidates in the average party contesting the eight HOR elections between 1986 and 2009. This figure was created by calculating the variance in positions of candidates of the same party for each of the parties contesting these eight elections, and then calculating the mean within-party variance for each election. The means are plotted, with the vertical lines indicating their 95% confidence intervals. As expected, electoral reform is associated with a decline in dispersion among candidates of the same party.

Table 2: Estimates from a structural break test. The dependent variable is dispersion among candidates of the same party for all parties fielding candidates in these eight HOR elections. Electoral reform had a statistically significant negative impact on dispersion within a party, controlling for the passage of time and other party-level differences.

	Interaction	(with controls)
(Intercept)	0.82***	0.81***
	(0.15)	(0.16)
Time	−0.14*	−0.14†
	(0.06)	(0.07)
Electoral Reform	−0.82***	−0.84**
	(0.17)	(0.24)
Time × Electoral Reform	0.17**	0.17*
	(0.06)	(0.08)
Party fixed effects		✓
N	57	57
R^2	0.51	0.60
adj. R^2	0.48	0.35

Standard errors clustered by party are in parentheses.

† significant at $p < .10$; $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$

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Dispersion within the LDP

The paper also examined dispersion within the LDP. Dispersion in LDP candidate positions was 0.45 in 1986 (n=323 candidates), 0.67 in 1990 (n=334), 0.22 in 1993 (n=284), 0.09 in 1996 (n=287), 0.11 in 2000 (n=271), 0.10 in 2003 (n=277), 0.12 in 2005 (n=290), and 0.13 in 2009 (n=289). Figure 9 plots these variances, with the vertical bars representing their 95% confidence intervals. The figure shows that while dispersion in LDP candidate positions fluctuated in the three elections under the old system, it is lower and more stable between elections under the new.
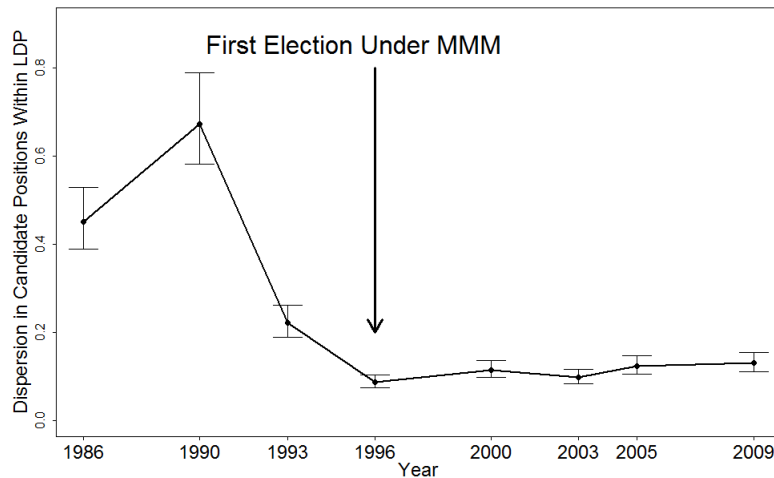

Figure 9: The dispersion in LDP candidate positions in the eight HOR elections between 1986 and 2009. This figure plots the variance in positions adopted by the 2,355 LDP candidates who ran in these eight elections. The variances are plotted, with the vertical lines indicating 95% confidence intervals around these variances. While dispersion in LDP candidate positions fluctuated in elections under the old system, electoral reform was associated with a decline in dispersion.

Figure 9 reveals that dispersion in LDP candidate positions can contribute to explaining why the mean within-party dispersion in 1993 (depicted in Figure 8) was higher than the other two elections under this system. In 1993, LDP candidates faced fewer same-district co-partisans because not enough new candidates had been nominated to replace those who had defected. Fewer same-district co-partisans would have reduced their incentives to position themselves at some distance from each other. To evaluate whether the decline in dispersion within the LDP between 1990 and 1993 is at least partially attributed to the decline of intra-party competition facing certain LDP candidates, we divided LDP candidates who ran in 1993 into two categories: those who faced the same number of

co-partisan competitors in their districts in 1993 and 1990; and those who faced fewer co-partisan competitors in 1993 relative to 1990. If the decline in LDP candidate dispersion between the two elections is partially explained by the reduction in intra-party competition, then it is reasonable to expect that dispersion in LDP candidate positions in 1993 will be larger when calculated with the former group than when calculated with the latter group. We find some evidence of this. When dispersion in LDP candidate positions is calculated with the 141 LDP candidates who experienced the same level of intra-party competition in 1993, it is 0.26. When it is calculated with the 104 LDP candidates who experienced a decline in intra-party competition in 1993, it is 0.19.

Appendix E: The 2009 DPJ Landslide (Supplementary Information)

In the paper, we showed that the unusual levels of dispersion in districts and parties in 2009 are attributable to the behavior of DPJ candidates: there was greater dispersion in DPJ candidate positions in 2009 and the average DPJ candidate located herself further to the left of her same-district LDP opponent. We suggested that these effects can be explained by left-leaning DPJ candidates who were confident they were going to win locating themselves further to the left, while their colleagues who were less confident and who had right-leaning preferences did not. We asked a DPJ politician why his party positioned itself further from the LDP in 2009 and his answer provides some support for this:

> "We tried to model ourselves on the LDP to get the public to see us as different from the old opposition parties. We wanted to paint the picture of us as a "responsible alternative". But when it looked like we were about to get power, we thought we'd built ourselves up enough, succeeded in creating an image as "responsible", so we should emphasize our differences with the LDP, you know, reveal our true colors".[6]

Evidence existed as early as a month before DPJ candidates would have been writing their manifestos for the August 30 election that their party would emerge victorious. Candidates are required to submit their manifesto to their local electoral commission by 5pm on the first day of the official campaign, which in this case was August 18. In early July, a survey conducted by

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[6]Interview, HOR Member and DPJ Member Nagashima Akihisa, May 5, 2015, New York, NY.

the conservative-leaning Yomiuri Shimbun revealed that 41% of respondents planned to vote for the DPJ in PR (compared to 24% for the LDP); 41% planned to vote for the DPJ candidate in their SMD (compared to 23% for the LDP candidate); and when asked who they thought was a suitable Prime Minister, 46% named DPJ leader Hatoyama Yukio (compared to 21% who named the current LDP Prime Minister, Aso Taro) (Yomiuri Shimbun, 2009*a*). Subsequent iterations of the same poll conducted on July 21-23, August 4-6, August 18-20, and August 25-27, respectively, yielded similar estimates of the party's lead (Yomiuri Shimbun, 2009*b,d,c*). These poll results would have been bolstered by the party's decisive victories in a string of local elections, including the Tokyo Metropolitan Assembly election in July, in which 40% of ballots cast went to DPJ candidates (compared to only 25% that went to LDP candidates). The media described these victories as a "barometer" for what was about to happen at the national level (e.g. Daily Yomiuri, 2009).

Evaluating our claim is difficult because while we can analyze the determinants of distance between a DPJ candidate and her same-district LDP opponent in 2009, we cannot control for movement made by that opponent. Savvy LDP candidates who were able to foresee their DPJ opponent making a shift to the left would have done well, if their reputations permitted, to "chase" them. The possibility of "chasing" by an LDP opponent interferes with any attempt to examine whether electoral security and ideological leaning influenced the degree to which DPJ candidates moved leftward. We settled for a second-best approach. We regressed the absolute distances between the positions of all 263 DPJ candidates and their same-district LDP opponents in 2009 on the following variables: the number of elections the DPJ candidate had contested; whether her 2009 LDP opponent was competitive (defined as having won the same district in 2003 and 2005); an interaction between the DPJ candidate's experience and the competitiveness of her opponent; whether the DPJ candidate had formerly run as a socialist; whether the DPJ candidate had formerly run from the LDP; whether the DPJ candidate had formerly run as an Ozawa Liberals candidate; the DPJ candidate's gender; the DPJ candidate's age; whether the pair had also run against each other in the 2005 election; the urbanness of the district; and the prefecture in which the district was located.

Table 3 presents the results. The significant negative coefficient on Competitive LDP shows that DPJ candidates who faced a competitive LDP opponent without election experience were located *closer* to their LDP opponents in 2009. These are the candidates who would have been the least

assured of victory. The significant positive coefficient on Former JSP indicates that DPJ candidates who were former socialists were located *further* from their LDP opponents. This is the best proxy for whether the DPJ candidate had left-leaning preferences. A series of prefectures were also associated with more distance.[7] Among these were Iwate and Fukushima, where the DPJ was widely expected to (and did) win all SMDs. It is likely that DPJ candidates in those prefectures felt more assured of victory. While an imperfect test, these results suggest that candidates with left-leaning preferences and candidates who were confident they would win located themselves on the left.

Appendix F: Alternative Explanations (Supplementary Information)

In the paper, we consider whether the decline in within-district dispersion can be explained by a convergence in the preferences of large party supporters. Further evidence against this can be found in the issues discussed in the manifestos. If voters were unhappy with how the opposition parties were dealing with the new security threats, globalization, or economic recession, for example, and sought the formation of another party like the LDP to deal with these, it is reasonable to expect that this would be reflected in what was discussed in 1993 and converged on in 1996. Using the validated topics uncovered with topic modeling of the same collection of manifestos in Catalinac (2016), we found that approximately 49% of the average candidate manifesto in 1993 concerned topics related to political reform (reducing corruption, issuing stricter fines, and electoral reform), 25% concerned discussion of private goods for the candidate's district, less than 2% concerned Japan's role in the global economy, and national security did not feature. Curtis (1999) also found that voter anger about the economy was largely missing in 1993. In 1996, 27% concerned topics related to political reform and 20% was devoted to private goods. National security increased to 0.3%, while Japan in the global economy dropped to 1%. In 1996, candidates from the three large parties appeared to converge on the need for reform in the areas of streamlining and reorganizing the central government, elevating the role of politicians relative to bureaucrats in the policymaking process, devolving power to the regions, and expanding redistribution. There is little evidence of a groundswell of concern

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[7]These were Iwate, Fukushima, Okayama, Tottori, Toyama, Gifu, and Shimane.

Table 3: Absolute distance between DPJ and LDP candidate positions in 2009 is regressed on the DPJ candidate's experience, the competitiveness of her LDP opponent, an interaction between the two, and other variables. DPJ candidates facing a competitive LDP opponent without election experience were located closer to that opponent. DPJ candidates with left-leaning preferences were located further from that opponent.

	Model 1
(Intercept)	0.24
	(0.46)
Competitive LDP Opponent	-0.38^*
	(0.18)
Number of Prior Runs	-0.15^{**}
	(0.05)
Competitive LDP Opponent $\times$ Prior Runs	0.21^{**}
	(0.07)
Former LDP Candidate	0.23
	(0.23)
Former Socialist Candidate	0.66^*
	(0.34)
Former Ozawa Liberals Candidate	-0.34
	(0.37)
Urbanness of District	0.42
	(0.31)
Female	$0.34^\dagger$
	(0.19)
Age	0.02^*
	(0.01)
Ran Against Opponent in 2005	0.08
	(0.15)
Prefecture fixed effects	✓
N	263
R^2	0.31
adj. R^2	0.12

Standard errors in parentheses

$\dagger$ significant at $p < .10$; $^*p < .05$; $^{**}p < .01$; $^{***}p < .001$

about national security or the economy, which would be consistent with a claim that voters were so concerned they sought the formation of a second large party, which then converged on the LDP's position.

The paper then considers whether the decline in within-party dispersion is explained by a homogenization of preferences of party supporters. We argue that this would not have been sufficient to push candidates closer to their co-partisans under the old system because they would still have needed ways to differentiate themselves. As further evidence of this, the paper's Figure 4 introduced

the three LDP candidates who contested Okayama 1st in 1993 and the new Okayama 1st, 2nd, and 3rd districts in 1996. Despite being located relatively close together in 1993 (between the median (1.01) and third quartile (1.35) of the LDP candidate distribution), shades of disagreement in their positions on political reform were apparent. Hiranuma (located at 1.35) told voters that the changes happening in Japan and elsewhere meant that they ought to prioritize political stability, and recognizing that, he planned to remain in the party, where he had already been campaigning for reform, and rebuild it from within. Kumashiro (1.14) told voters that the LDP needed to develop "new political feelings" and as a newcomer, he was well-positioned to help it do that. He promised to realize elections that cost less and impose larger fines on politicians who broke the law. Aisawa (0.46) wrote a shorter, snappier manifesto with the headline "Declaration of the New Group of Reformers!", in which he promised to use his youth and passion to bring about political and party reform. Their manifestos also embodied differences in other areas: Hiranuma spoke of the need to realize a more harmonious society and protect traditional Japanese mountain villages; Kumashiro bemoaned the fact that women were not having and raising children, which he attributed to Japan's excessive focus on economic growth; and Aisawa promised to create a society in which the elderly and disabled would be able to work.

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