National Representation and Local Public Expenditure: A Natural Experiment from Japan

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Abstract

In Japan's mixed-member electoral system, a candidate who fails to obtain a plurality of votes in a district can still be elected to a proportional representation (PR) seat through a party list, giving her district two de facto representatives instead of one (nominal district representative). By exploiting electoral discontinuities in the allocation of PR seats for causal identification, I find that an additional representative, on average, increases municipal expenditure by 1.4%. Within districts that gain an additional representative, municipalities that lean strongly toward the second representative experience greater increases in public spending, but so do municipalities that vote strongly for the first representative. Winning a PR seat increases a candidate's likelihood of running in the district race in the next election, especially if they lose the district race by a wide margin. However, the first-past-the-post winner's probability of re-election is not harmed by the presence of a PR seat incumbent.

Keywords: Political Representation, Mixed-Member Electoral System, Majoritarian, Proportional Representation, Local Public Expenditure, Incumbency, Ranks.

JEL Classification Numbers: D72, H72, H77, K16.

1 Introduction

Does the number of political representatives of a local area affect the allocation of public resources? In a representative democracy, the primary means by which citizens affect policies is through their representatives. Therefore, the number of representatives is often considered to be a proxy for the political power possessed by a group of citizens. For example, each state, regardless of population, has two senators in the U.S. Senate, which gives small states more representatives on a per capita basis. Atlas et al. (1995) and Lee (1998) find that per capita federal spending is larger in smaller states. This rationale underpins the legal justification for equal apportionment of representatives across a polity. However, the apportionment of representatives is typically fixed within an electoral system, making it difficult to establish a causal link between de jure political representation and the allocation of public resources.

De jure political representation, however, need not provide de facto representation. For example, black Americans were effectively disenfranchised after Reconstruction (Keyssar, 2009). After the landmark passage of the Voting Rights Act (VRA) of 1965, which ensured the voting rights of African Americans, many U.S. cities altered their electoral rules to minimize the political representation of minorities on city councils (Trebbi et al., 2008). More than two decades after passage of the VRA, although African Americans accounted for more than 20% of the population in the South, black candidates were not elected to the House of Representatives until the creation of majority-black districts (Tokaji, 2008; Washington, 2012). The distribution of public resources depends on the de facto enfranchisement of citizens (Naidu, 2012; Cascio and Washington, 2014; Cascio and Shenhav, 2020) and the identity of political representatives (Pande, 2003; Chattopadhyay and Duflo, 2004; Lee et al., 2004; Albouy, 2013), which in turn are heavily shaped by the rules of electoral systems (Persson and Tabellini, 2002; Fujiwara, 2015; Besley et al., 2017; Kaplan and Yuan, 2020).

A central classification of electoral systems distinguishes between majoritarian systems and proportional representation (PR) systems. In a majoritarian system, exemplified by the U.S. House of Representatives and the U.K.'s House of Commons, representatives with a plurality of votes in their districts are elected, and the party with a majority of seats governs. The majority party need not have the majority of votes, as occurred in the 2012 House elections. In a PR system, voters cast their ballots for a party list of candidates, and a party's share of seats in the legislature is roughly proportional to its share of the vote. Typically, though not always, the party or parties with a majority of votes obtain a majority of seats to form a government.

Representatives in a majoritarian system are typically elected from small and single-winner districts. By making politicians individually accountable to voters, majoritarian systems arguably provide better political accountability. Majoritarian electoral systems tend to be associated with less corruption (Persson and Tabellini, 2002; Persson et al., 2003; Kunicova and Rose-Ackerman, 2005). A PR system, by virtue of its proportionality, provides groups in a diverse society—especially minority groups—with proper representation (Folke, 2014). Moreover, PR systems typically have lower barriers for the entry of new parties, which allows greater fluidity in the political system to respond to a changing environment. In contrast, a two-party system tends to arise under the plurality rule in a majoritarian system (Duverger, 1963; Fujiwara, 2011).

Different electoral systems may trade off of accountability and representation. A mixed-member system, in which some members are elected directly from small districts and others are elected from party lists, is often thought to be the best of both worlds (Shugart and Wattenberg, 2001). An increasing number of new and established democracies, such as Korea, Taiwan, Japan, Mexico, Germany, and New Zealand, have adopted mixed electoral systems, which feature rules from majoritarian and PR system. However, little is known about how these mixed electoral systems perform.

In Japan's mixed-member electoral system, a candidate who fails to obtain a plurality of votes in a single-member district (SMD hereafter) may still be elected through a party list, which effectively gives her district two representatives instead of one. In this paper, I study whether and how the additional representative affects local public expenditure and electoral competition. To obtain quasi-experimental variation in the assignment of representatives elected through party lists (hereafter PR representatives), I exploit two sources of discontinuities in Japan's electoral system.

A candidate who loses in a district may still be elected if her ranking on the party list is high enough. Her ranking on the party list depends on her performance in the district race relative to the winner in the district race. A small change in the vote share of either the losing candidate or the winning candidate may alter the ranking of the losing candidate on the party list. This is the first source of discontinuity in Japan's mixed-member electoral system that I exploit.

The second discontinuity comes from the ripple effects of the outcomes of close elections. A candidate who narrowly loses in a close election is likely to have a high ranking on her party list. If a small electoral shock leads the candidate to instead win in the close election, she vacates her position on the party list, which allows another candidate on the same party list to be elected. A close election in one district may, therefore, create a ripple effect on whether other districts may have an additional representative.

In a standard regression discontinuity design, two candidates compete for office. Whichever candidate obtains more than 50% of the votes wins. In elections in which candidates' vote shares are sufficiently close to the 50% threshold and no one could manipulate the vote share in a small neighborhood around the threshold, the assignment of winners is as if random, because a small random shock could alter them. I generalize this idea by perturbing the observed vote shares slightly to generate a counterfactual allocation of PR representatives to districts. By exploiting the electoral discontinuities in the allocation of PR seats, I construct a sample of districts in which the assignment of a second representative is as if random.

Using the quasi-randomized sample of districts, I find that having an additional representative, on average, increases total municipal expenditure by 1.4% and discretionary spending on public works by 5.8%. Moreover, within districts that are gaining representation, municipalities with a large share of supporters for the additional representative gain, but so do municipalities with strong support for the first representative. Because the second representative is likely to compete with the first representative in the following election, the presence of an extra representative weakens the incumbency advantage of the first representative, which intensifies electoral competition. This result suggests that political competition incentivizes politicians to bring public spending to core supporters in their districts.

However, because the first representative responds to the presence of another incumbent seeking his district seat by providing more public spending to municipalities that strongly support him, and that the PR (i.e., 2th) incumbent deters the entry of new and potentially competitive challengers, the re-election probability of the first representative is not weakened by the second representative. These results suggest that in Japan's mixed-member system, the presence of PR representatives has subtle implications for electoral competition.

This paper contributes to several strands of literature on political representation, electoral competition, and the distribution of public spending. First, it contributes to the literature on the apportionment of representatives to electoral districts and how the seat-to-population ratio affects public spending. Atlas et al. (1995) and Lee (1998) find that small states have larger per capita federal spending in the U.S. Since the number of Senate seats for a state is fixed, cross-sectional variation in the seat-to-population ratio is driven by population, which potentially correlates with omitted factors that affect public expenditure.

Ansolabehere et al. (2002) investigate state government spending before and after a Supreme Court decision mandating the one-person-one-vote principle in the apportionment of state legislatures. Horiuchi and Saito (2003) use changes in seat-to-population ratio due to the 1994 electoral reform in Japan, which I will explain in the next section. The

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difference-in-differences estimates in both studies suggest that a greater seat-to-population ratio increases local public spending. My paper differs from these two papers by focusing on short-term local variation in de facto representation driven by the presence of PR representatives. Large-scale redistricting and electoral reforms likely shift the power structure and dynamics in the legislature. For example, redistricting after the Supreme Court decision shifted political power from rural areas to urban areas. The electoral reform in Japan not only changed the apportionment of representatives across districts, but also altered the electoral rules and systems, the magnitudes of the electoral districts, campaign finance regulation, etc. These structural changes likely have important and different implications on how de facto representation affects the allocation of local public expenditure.

Second, this paper contributes to the literature that studies how electoral competition affects political accountability and effective representation. A number of studies have found that electoral competition is crucial in mitigating political agency problems (see, e.g., Besley et al., 2010). However, in a political agency model with both moral hazard problems and adverse selection problems, an incumbency advantage naturally arises because voters are, to some extent, able to select better politicians through previous elections. What is challenging is to empirically disentangle the incentive effects of incumbency advantage from the selection effects of incumbency advantage. In this paper, the quasi-randomized assignment of an additional representative to a district constitutes a negative shock to the incumbency advantage of the first representative. When a district is exogenously assigned a second representative, such a shock has no effect on the selection of the first representative. However, the disincentive effect of incumbency advantage for the first representative is weakened, because the first representative is likely to compete with another incumbent in the following election. This result suggests that electoral competition is of first-order importance in translating greater representation into more public spending.

A related literature studies whether politicians target areas in which their supporters concentrated or swing areas that may be easy to persuade with public spending. See, e.g., Dixit and Londregan (1995, 1996). Empirical results have been mixed. See, e.g., Larcinese et al. (2006); Nichter (2008); Drazen and Eslava (2010); Hahn et al. (2018). My findings suggest that the targeting behavior depends on whether there is more than one incumbent. When there is only one incumbent, credit attribution would be straightforward. With the presence of two incumbents, however, municipalities with strong partisan leanings benefit, since they could attribute the increased spending to their favored representative. These findings highlight the crucial dependence of distributive politics on electoral institutions and electoral competition. My findings are also consistent with the important roles of media and political information in electoral competition and government responsiveness (Ström-

berg, 2004; Besley and Burgess, 2002; Snyder and Strömberg, 2010).

Third, this paper adds to the literature on electoral rules and public finance. Legislators elected from small, geographically defined districts have electoral incentives to lobby and bargain for greater government spending on goods and services in their districts. Governments in majoritarian systems also have electoral incentives to target electorally vulnerable districts with government expenditure. In a PR system in which parties represent social groups that may be geographically dispersed, transfers to social groups via welfare programs may be more effective in gaining electoral rewards than spending on goods and services, such as infrastructure projects. Patterns of government spending across countries are consistent with these tendencies (Milesi-Ferretti et al., 2002).

In Japan's mixed-member electoral system, PR representatives' supposedly broad appeal is weakened through its linkage to (dual) PR candidates' performance in single-member district (SMD, or simply district) races, which retain electoral incentives for PR representatives to cater to geographically narrow interests. My findings highlight the fact that detailed electoral rules matter in constitutional designs. In many clientelistic democracies, in which the exchange of goods and services for political support between voters and political parties is pervasive, electoral systems that weaken the importance of personal power bases could facilitate the rise of programmatic transfers, which in many cases are more efficient and less corrupt (Keefer, 2007; Keefer and Vlaicu, 2007; Stokes et al., 2013). However, a mixed-member system need not offer an improvement over a simple majoritarian one if rules such as those found in Japan's mixed-member system shape the behavior of representatives.

Fourth, this paper contributes to the literature on the effects of electoral institutions on electoral outcomes and electoral discourses.[1] In particular, a number of recent works have explored the salience of ranks under various electoral systems. Anagol and Fujiwara (2016) document the effects of being the runner-up, as compared to finishing in third place, on participation and success in subsequent elections in first-past-the-post elections in Brazil, Canada, and India. Folke et al. (2016) document that preference votes in Sweden's semi-open-list PR system and Brazil's open-list PR system shape the internal organization of parties. Granzier et al. (forthcoming) show that candidates who barely qualified for runoff in France's two-round elections are substantially more successful in future elections than

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[1]For recent works, see Besley et al. (2017) for a study of the effects of gender quotas in Swedish party lists on female representation and the competency of male politicians; Fujiwara (2011) on strategic voting and Duverger's law under single-ballot and two-round runoff plurality systems; Broberg et al. (2022) on the effects of public funding of campaigns on candidate selection and electoral competition in France; Bouton (2013) on strategic voting in runoff elections; and Bordignon et al. (2016) on the relationship between political extremism and runoff elections.

those who did not, highlighting the visibility of runoff qualification facilitates coordination among parties and voters.

This paper illustrates the intricate relationship between performance in the first-past-the-post part of Japan's mixed-member majoritarian system and the ranks on the party list in the proportional representation (PR) part of the system. I then explore this relationship to investigate the effects of elected office on distributive politics and various aspects of electoral competition, such as incumbency entrenchment and challenger entry. My results corroborate the findings that the salience and visibility of a candidate shape electoral dynamics and are consequential for public policy.

The remainder of the paper is organized as follows. Section 2 describes the institutional backgrounds and data. In particular, how and why in Japan's mixed-member system, some districts may have an additional de facto representative. Section 3 illustrates my empirical strategy. Section 4 presents the main estimates on the effects of political representation on local public expenditure. Section 5 discusses the distribution of additional public expenditure from having a PR representative within a district, and how a PR representative affects electoral competition. Section 6 concludes.

2 Background and Data

2.1 Japan's Mixed-Member Electoral System

From 1947 to 1993, Japan had an electoral system that featured multi-member districts (MMD) and a single, nontransferable vote (SNTV). The nation was divided into more than 100 medium-size districts. Each district elected two to six members to the House of Representatives—the lower house of Japan's parliament—for a term of four years. Candidates in each district with the highest vote count were elected. The upper house—the House of Councillors—was elected through a similar MMD plurality rule, though its members were elected from larger districts for a longer term. Typically, then and now, a majority coalition in the House of Representatives forms the government and elects one of its members as prime minister. The prime minister can dissolve the House of Representatives before its term expires and call for early elections, but can not do this with the House of Councillors.

While the House of Councillors retains considerable legislative power, the House of Representatives prevails in disagreements between the two chambers on important decisions, such as passing a budget, ratifying treaties, and choosing a candidate for prime minister. Moreover, the lower house can override the upper house's objection on a regular bill by a

two-thirds majority. Due to the dominant role of the House of Representatives, Ackerman (2000) refers to Japan's constitutional design as a "one-and-a-half house solution." In this paper, I will focus on the House of Representatives.

The Liberal Democratic Party (LDP) had been the ruling party since 1955, but in the 1993 general election it lost its governing position for the first time. A governing coalition was formed by eight small anti-LDP parties. Led by Prime Minister Morihiro Hosokawa in 1994, the 11-month governing coalition replaced the previous MMD-SNTV system with a mixed system for the lower house.

Under the reform, the House of Representatives was given 500 seats, of which 300 seats were from single-member districts with a first-past-the-post (FPTP) rule, while 200 seats were elected from proportional representation (PR) party lists grouped by 11 regional PR blocks. After the first election under the new electoral system in 1996, the number of PR seats was reduced to 180, while the number of SMD seats remained unchanged.

In the new system, each voter has two votes: one for a candidate in her single member district and another for a party list in her PR block. A voter casts the two votes simultaneously. However, the SMD vote need not be for a candidate from the same party as the PR vote. The boundaries of PR blocks do not cross the boundaries of prefectures, which are the first subnational level of administrative divisions. Similarly, the boundaries of prefectures do not cross the boundaries of SMDs. Hence, a PR block contains one or several prefectures, and a prefecture contains several SMDs.

Figure 1 is a map showing how Japan is divided into 11 PR blocks, each in a different color. Each PR block consists of one or several prefectures, as delineated by dashed lines. The number of SMDs in each prefecture in the 2012 election is labeled on top. A fixed number of PR seats is allocated to a PR block before each election and parties propose a party list in each PR block to compete for the PR seats allocated to that block. PR seats in a PR block are allocated to parties in proportion to their PR vote shares in the block. Vote shares outside a PR block have no bearing on allocation of PR seats within the PR block, and the total number of SMD votes obtained by a party's candidates in a PR block bears no consequences for the total number of PR seats allocated to the party.

As in some other mixed-member systems, such as those of Germany and New Zealand, dual candidacy is permitted. A candidate can be on both the SMD ballot and the PR list ballot. If a candidate wins a seat from an SMD, she takes that seat and vacates her position on the party list. If a candidate loses in the SMD race, she can still obtain a PR seat if her ranking on the PR list is favorable relative to the number of PR seats her party won in the regional PR block. In Germany and New Zealand, allocation of PR seats is used to top up district seats, so that the overall shares of seats going to each party proportionally reflects

Figure 1: Division of PR Blocks and Number of SMDs in Each Prefecture

Notes: Different PR blocks are color-coded. Numbers indicate the number of SMDs in a prefecture.
Source: Japanese Ministry of Internal Affairs and Communication, as of 2012.

the vote shares of parties nationwide. But in Japan's system, the number of SMD seats (or constituent seats) and the number of PR seats are fixed. The SMD system and the PR system are parallel, in the sense that the number of PR seats a party obtains only depends on its performance in the PR vote and the number of SMD seats a party obtains only depends on its candidates' performance in SMD races.

Consider further the comparison of Germany and Japan. The lower house of the German legislature, the Bundestag, has 598 members, with half elected from single member districts and the other half from party lists, proportionally allocated to parties according to nationwide party vote shares. If a party obtains 50% of party votes nationwide and its nominees win 100 seats in the single member districts under the first-past-the-post rule, the number of PR seats allocated to the party is 199 = 598 / 2 - 100.[2]

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[2]In the case that a party has more members elected from SMDs than its overall seat share implied by the

In Japan, on the other hand, the number of PR seats a party wins is the sum of PR seats won in each PR block, which in turn is determined solely by PR vote shares in each block, independent of the number of SMD seats won or nationwide PR vote shares.[3] Table 1 summarizes the numbers of PR seats, prefectures, and SMDs in each PR block.

Table 1: Division of Proportional Representation Blocks

PR Block	Number of Prefectures	# PR Seats			# SMDs	
		1996	2000	2003 - 2012	Pre-2003	2003 - 2012
Chugoku	5	13	11	11	21	20
Hokkaido	1	9	8	8	13	12
Hokurikushinetsu	5	13	11	11	20	20
Kinki	6	33	30	29	47	48
Kitakanto	4	21	20	20	31	32
Kyushu	8	23	21	21	38	38
Minamikanto	3	23	21	22	32	34
Shikoku	4	7	6	6	13	13
Tohoku	6	16	14	14	26	25
Tokai	4	23	21	21	34	33
Tokyo	1	19	17	17	25	25
Total	47	200	180	180	300	300

While the SMD system and PR system are parallel, in that the allocation of PR seats across parties does not depend on the outcomes of SMD races, the two systems are connected in the intraparty allocation of PR seats. A special feature of the party PR lists is that rankings are partially determined ex ante and partially determined ex post. Candidates on the PR lists are ranked by their parties before the election.

However, parties can give multiple candidates equal rank on the ballot. Ex ante equally ranked dual candidates' ex post ranks within a cluster are determined by their performance in their own SMD, specifically by their vote share divided by the winning candidate's SMD vote share. The higher this ratio—which is known as the narrowness-of-defeat ratio and hereafter the narrowness ratio—the higher a dual candidate's rank within the cluster.

For example, suppose all candidates on a party list are dual candidates who lose their SMD races. Amy ranks first ex ante on the list, but Ben, Cameron and David rank equally

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national party vote share, some additional seats, known as overhang seats, are added to the 598 regular seats to accommodate the crowd-out of PR seats for other parties that would otherwise occur. See Spenkuch (2015) for a detailed description and a peculiar case, in which voters in a special election had perverse incentives to not vote for their preferred parties due to, among others, the overhang provisions.

[3] The mapping from PR vote share to PR seat share in a PR block follows the D'Hondt method.

second ex ante. The ex post ranks of Ben, Cameron, and David will be given by their vote shares in the SMD races as compared to the winning candidates from the respective SMDs. If their party obtains two seats in the PR block, Amy will get a PR seat regardless of her narrowness ratio, while the candidate among Ben, Cameron and David with the highest narrowness ratio will get the second seat.[4] The narrowness ratio applies to all parties that rank their (dual) candidates equally in some parts of their party lists for PR seats.

In this paper, I focus on the six general elections for the House of Representatives since the electoral reform in 1994, which were held in years 1996, 2000, 2003, 2005, 2009, and 2012. I obtained data on party lists and election results from the website go2senkyo.com for all six elections. The go2senkyo.com data also include basic information on candidates such as name, gender, age, and party affiliation. Official election results for the latest three elections are also available from the website of the Japanese Ministry of Internal Affairs and Communications, which I obtained to verify the data from go2senkyo.com. Few discrepancies were found. I also obtained municipal-level voting data from 1996 to 2005 from *Asahi Shimbun*, one of the major national newspaper in Japan.

Figure 2 summarizes the numbers and shares of candidates seeking SMD seats, PR seats, or both over the six elections. There were 6,908 candidates for SMD seats, who are represented by the vertically oriented rectangular box with dashed blue borders. There were 5,240 candidates for PR seats, who are proportionally represented by the horizontally oriented rectangular box with dashed red borders. The overlapped area of these two boxes represents dual candidates, who sought an SMD seat while being listed on a party list for PR seats. More than half of all candidates were dual candidates; specifically, 59% of SMD candidates and 78% of PR candidates were dual candidates.

Of the candidates who are competitive in SMD races, most are dual candidates. The shaded blue box with solid edges in the middle of Figure 2 represents the 1,800 candidates elected to SMD seats. Of these, 83% are dual candidates. 622 candidates who lost their SMD races were elected to PR seats, accounting for 57% of total PR seats.

Legislators elected to an SMD seat and a PR seat may have different objectives and electoral incentives (Stratmann and Baur, 2002). However, if legislators who are defeated in SMD races but elected through the PR system are motivated to maintain a local base, this type of parallel voting system creates variation of de facto representation in the lower house across districts. There are several reasons candidates would have incentives to cater to local

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[4]There is one caveat. After the 1996 general election, the election law was amended such that any candidate who fails to obtain a 10% vote share in the SMD race will be disqualified. Her position on the PR list would be vacated regardless of her narrowness ratio, and her deposit for candidacy would be forfeited. This amendment has been taken into consideration in the implementation of my empirical strategy.

interests (McKean and Scheiner, 2000).

First and foremost, dual candidacy provides SMD-losing candidates an alternative route to a seat: If a candidate loses the SMD race, she may still be able obtain a seat through the party list. The reverse is not true. Moreover, PR lists are open; for most PR candidates of major parties, their performance in the SMD race determines their ranking on the party list for the PR seat.

Figure 2: Number of Candidates for SMD Seats, PR Seats, and Both
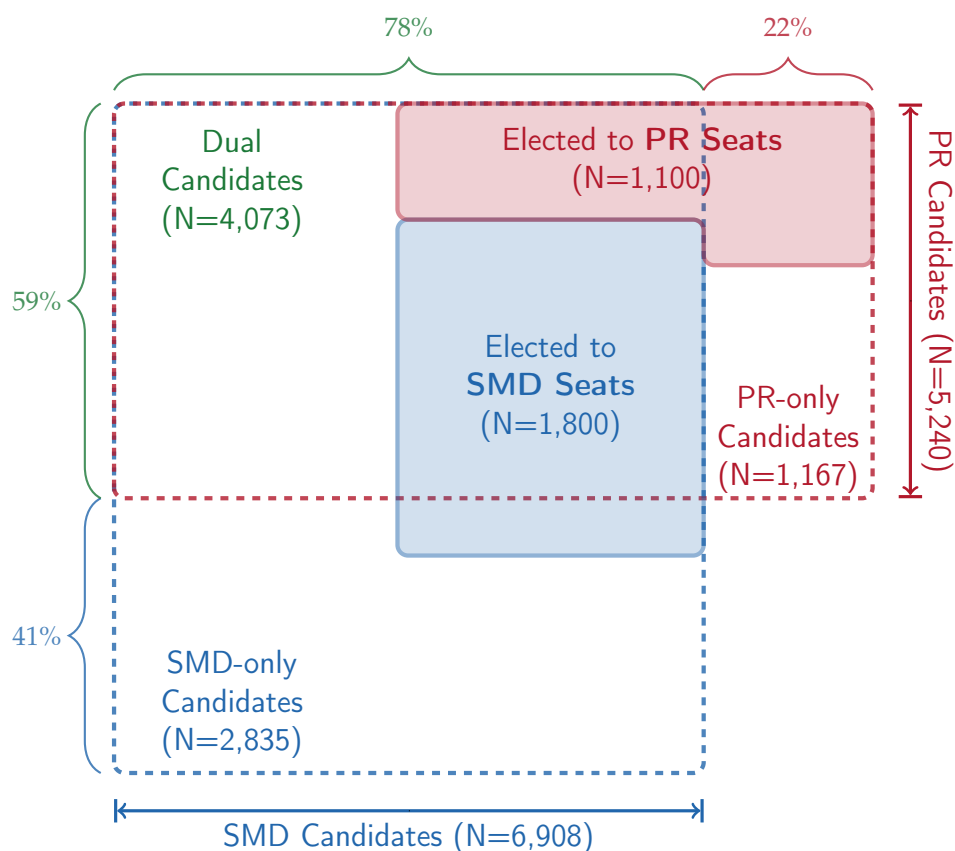
Notes: The figure above illustrates proportionally the numbers of candidates seeking for only an SMD seat (vertically oriented rectangle) and/or a PR seat (horizontally oriented rectangle). The overlap area indicates those dual candidates seeking both an SMD seat and PR seat. The shaded boxes inside with solid outlines indicate those elected to either an SMD seat or a PR seat.

The binned scatter plots in Figure 3 illustrate the importance of a supportive local base for a candidate's electoral prospects. In the left subplot, I plot the probabilities of election against candidates' vote shares in the SMD races. Unsurprisingly, the higher the SMD vote share, the more likely he or she is to be elected to an SMD seat. Dual candidates are more likely to be elected to a PR seat when their SMD vote shares are high, up to a certain point;

after that they may be elected to SMD seats instead. Overall, the probability of election to any seat is monotonically increasing in a candidate's SMD vote share.

An SMD candidate's decision to run for the same SMD seat in the next election is also positively related to her SMD vote share, particularly for those candidates who failed to obtain a plurality of votes in the SMD race. Compared to candidates who were not elected to any seat but had similar vote shares, candidates elected to PR seats were much more likely to run again in the next election, except when their SMD vote shares were below 15%. In sum, Figure 3 suggests that forward-looking PR representatives would have strong electoral incentives to maintain and cultivate local support, which gives their districts an additional de facto representative in the legislature.

Figure 3: Election and Rerunning Probabilities by Vote Share in A Single-Member District
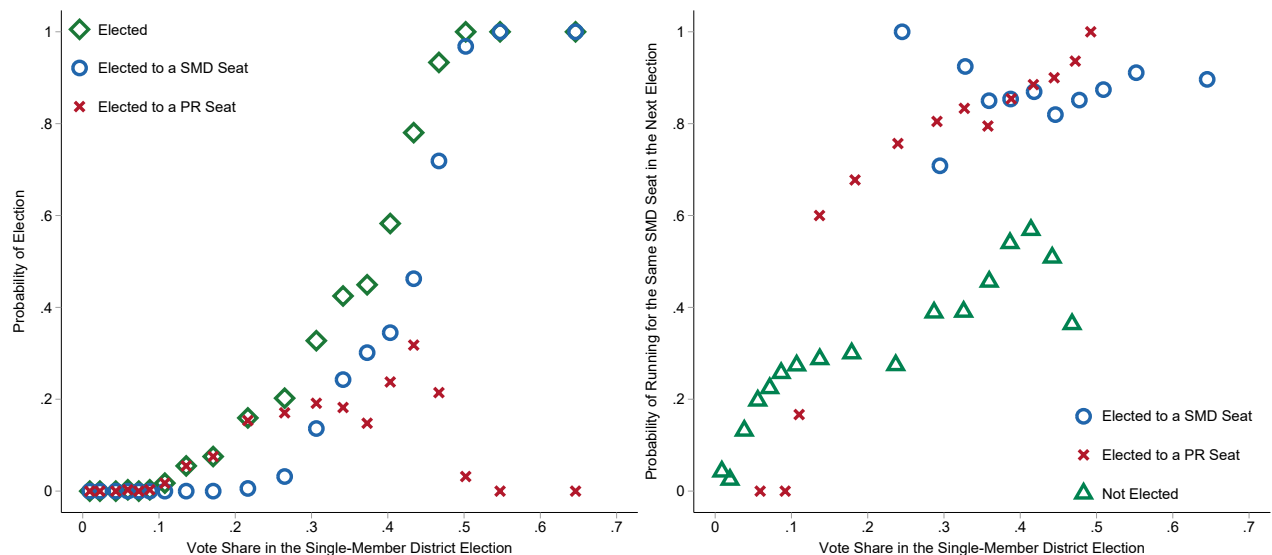
Notes: The SMD vote shares of all SMD candidates are grouped into 20 equal-sized bins in both binned scatter plots above, in which the horizontal axes represent the average vote shares of binned candidates in races for single-member district seats. In the left subplot, the vertical axis represents the share of SMD candidates in a bin being elected to (i) any seat in the parliament (indicated by hollow diamonds); (ii) an SMD seat (indicated by hollow circles); and (iii) a PR seat (indicated by ×). In the right subplot, the vertical axis represents the shares of SMD candidates running for the same SMD seat in the following election by incumbency status: (i) hollow circles indicate candidates who are elected to SMD seats; (iii) ×'s indicate candidates who are elected to PR seats; and (iii) hollow triangles indicate candidates who are not elected to any seat.

Second, the formation of new parties and changes in party membership are relatively frequent in Japan. The Democratic Party of Japan, which gained a majority in 2009 but lost it in the 2012 general election, was only founded in 1998. The third and the sixth parties

after the 2012 election were both founded in 2012, and together they won 63 seats. A local base provides politicians with political capital and puts them in a good bargaining position should changes in party affiliations occur. Lastly, it is not uncommon in Japan's political culture that seats are inherited by staffers or children of the incumbents (Taniguchi, 2008). A local base would facilitate such inheritance.

In this paper, I refer to the winner of a single-member district race as the SMD representative or the first representative interchangeably. I also refer to a dual candidate who lost the SMD race but was elected to the parliament to a PR seat as either PR representative or the second representative interchangeably.

2.2 Local Public Finance in Japan

Local governments in Japan account for the majority of government expenditure, but have very limited autonomy to raise revenue locally or through borrowing. Subnational governments account for about 59% of non-defense government expenditure in Fiscal Year (FY) 2007. For comparison, this figure was 52% in the U.S. Prefectural and municipal governments rely on the national government as a major source of revenue.[5] From FY 2002 to FY 2010, the total tax revenue of municipal governments, on average, accounted for 37.2% of total expenditure by municipal governments. Transfers from the national government and prefectural governments accounted for 33.3% and 4.7%, respectively. Other sources, such as debt, user fees, and revenue from governmental enterprise, made up the rest. Because large municipalities are more capable of generating local tax revenue than small municipalities, the median municipality relies even more on transfers from the national government than those averages would suggest. The median share of municipal revenue due to transfers from the national government ranges between 40% and 50% from FY 2002 to FY 2010.

Municipal governments in Japan are not legally subordinate to prefectures. Instead, the national Local Autonomy Law mandates the responsibilities and authority of municipal governments (Weese, 2015). Transfers from the national government are implemented by a tax sharing system. Several programs distribute funds to municipal governments, including the Local Allocation Tax, National Treasury Disbursements, and the Local Transfer Tax.

The Local Allocation Tax (LAT) is a formula-based general-purpose grant program that transfers fixed percentages of revenue from several major national taxes to municipal governments. To calculate the LAT transfer, national agencies take the difference between the cost of providing basic public services prescribed by law and the fiscal capacity of a munic-

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[5]As the immediately subnational administrative divisions, prefectural governments are analogous to state governments in the U.S. Prefectures are further divided into a number of municipalities.

ipal government. National Treasury Disbursements provide cost sharing of certain manda-tory public services, fund the cost of performing responsibilities of the national government entrusted to local governments, and support specific policies. Finally, the Local Transfer Taxes transfer a fixed proportion of revenue of several national taxes, mostly excise taxes, to local governments.

Though these programs are more or less formula-based, numerous factors and discre-tionary adjustments are considered. Anecdotal evidence suggests that the bureaucratic ap-plication of transfer formulas is not free from political intervention. For example, politicians in the late 1990s and early 2000s successfully lobbied the Ministry of Home Affairs to in-clude access to high-speed rail as a basic public service, allowing the use of LAT grants to fund bullet train expansion projects in remote areas (DeWit, 2002).

Given the municipal governments' fiscal reliance on the national government, I focus on total municipal expenditures to measure the effect of political representation in the national government on local public finance. However, I also study the effect of political representa-tion on different types of local public spending, although data for these measures are more limited.

Demographic data and basic public finance data for municipalities were taken from two sources: the Minryoku database and the Ministry of Internal Affairs and Communications. The Minryoku database was compiled by Asahi Shimbun Publications Inc. from various governmental agencies. Municipal public expenditure data and local tax revenue from FY 1997 to FY 2009 were available in the Minryoku database. More detailed breakdowns of revenue and expenditure of municipal governments from FY 2002 to FY 2010 are available from the Ministry of Internal Affairs and Communications.

3   Empirical Strategy

3.1   Electoral Discontinuities

The ranking of ex ante equally ranked dual candidates and the priority of SMD seats over PR seats provide two sources of electoral discontinuities, which I exploit for quasi-experimental variation in the assignment of PR representatives. The first is close narrowness ratios among ex ante equally ranked dual candidates.

To illustrate, consider the party list of the LDP in the general election of 2009 for the PR block of Kitakanto in Table 2.[6]

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[6]The PR block of Kitakanto is north of Tokyo Prefecture, and is orange in Figure 1.

Twenty seats were allocated to the PR block of Kitakanto in 2009. The LDP won 25.84% of party votes in this PR block, and hence obtained six seats based on the D'Hondt method of seat allocation.

Candidate Genichiro Sata was a PR-only candidate and occupied the singleton top rank on the list. After Sata, 26 candidates were equally ranked second. They were dual candidates, each competing in one SMD within the Kitakanto PR block. At the bottom of the list, two PR-only candidates were ranked 28th and 29th.

Table 2: LDP List for the PR Block of Kitakanto in the 2009 General Election

Rank ex ante	Name of Candidate	Narrowness ratio	Rank ex post	Seat won	SMD (dual)	V. Share in SMD	Winner's v. share
1	G. Sata	-	1	PR	-	-	-
2	Y. Obuchi	-	-	SMD	Gunma 5	0.710	0.710
2	T. Motegi	-	-	SMD	Tochigi 5	0.517	0.517
2	H. Kajiyama	-	-	SMD	Ibaraki 4	0.507	0.507
2	F. Nukaga	0.976	2	PR	Ibaraki 2	0.479	0.491
2	K. Nagaoka	0.812	3	PR	Ibaraki 7	0.301	0.370
2	Y. Shindo	0.801	4	PR	Saitama 2	0.401	0.500
2	M. Shibayama	0.797	5	PR	Saitama 8	0.391	0.491
2	T. Sato	0.781	6	PR	Tochigi 4	0.402	0.515
2	Y. Niwa	0.772	7	-	Ibaraki 6	0.420	0.543
2	Y. Yamaguchi	0.770	8	-	Saitama 10	0.425	0.551
2	H. Funada	0.765	9	-	Tochigi 1	0.413	0.540
2	T. Otsuka	0.728	10	-	Saitama 9	0.412	0.567
2	T. Kojima	0.715	11	-	Saitama 12	0.409	0.572
2	Y. Tanaka	0.711	12	-	Saitama 15	0.371	0.521
2	Y. Hanashi	0.702	13	-	Ibaraki 3	0.401	0.571
2	S. Tsuchiya	0.701	14	-	Saitama 13	0.361	0.515
2	T. Mitsubayashi	0.687	15	-	Saitama 14	0.393	0.572
2	H. Makihara	0.650	16	-	Saitama 5	0.385	0.592
2	H. Chuko	0.618	17	-	Saitama 4	0.335	0.542
2	H. Imai	0.617	18	-	Saitama 3	0.371	0.600
2	N. Akagi	0.612	19	-	Ibaraki 1	0.350	0.571
2	H. Okabe	0.594	20	-	Ibaraki 5	0.364	0.613
2	K. Nishikawa	0.567	21	-	Tochigi 2	0.357	0.629
2	Z. Kaneko	0.476	22	-	Saitama 1	0.290	0.609
2	K. Nakane	0.453	23	-	Saitama 6	0.306	0.676
2	E. Arai	0.363	24	-	Saitama 11	0.256	0.707
28	M. Namiki	-	25	-	-	-	-
29	M. Otaka	-	26	-	-	-	-

Notes: Kitakanto is an area north of Tokyo prefecture. SMDs are named with the prefecture followed by the district number in the prefecture. For example, Gunma 5 is District 5 of Gunma Prefecture. In the general election of 2009, the LDP won 25.84% of party votes in the PR Block of Kitakanto. Therefore, six out of 20 seats in the PR block were allocated to the LDP. Moreover, three dual candidates won in their SMDs, thereby vacating their positions on the party list. The last column is the vote share of the winner in the SMD the dual candidate is contesting.

Sata took one PR seat by being at the top of the list as a pure PR candidate, leaving five

seats for candidates below him. Three dual candidates won in their respective SMDs, and hence took the SMD seats and vacated their positions on the party list. The SMD-losing dual candidates in the second-rank cluster were then ranked according to their narrowness-of-defeat ratio, i.e., their vote share divided by the vote share of the winner in their own district. The five candidates with highest narrowness ratios obtained the remaining PR seats. The narrowness ratio of Tsutomu Sato, who took the last PR seat for the LDP in Kitakanto, was 0.781. Yuya Niwa, who had a narrowness ratio of 0.772 and was ranked ex post immediately below Sato, did not get a PR seat. In this case, Sato's Tochigi 4, obtained an additional de facto representative through the PR system, while Ibaraki 6, in which Niwa competed, did not.

In two-party elections under a plurality rule, the election outcome of a candidate is determined by a single number—i.e., his/her vote share margin over his/her opponent—and its relation to the known cut-off, zero. The threat to the internal validity of an RD design in such a standard setting is endogenous sorting around the cut-off due to electoral manipulation. This paper concerns the elections to PR seats of dual candidates. The cut-off of narrowness ratio for the party's last PR seat is potentially determined by the order statistics of the narrowness ratios from all equally ranked candidates in a PR list cluster, rather than a single number. Determination of the cut-off depends on multiple vote counts among candidates whose identities are ex ante uncertain. It would be extremely difficult to engage in electoral manipulations near the cut-off to gain the last PR seat and award an SMD an extra de facto representative. Endogenous sorting in a small neighborhood of the cut-off is, therefore, highly unlikely.

If, in the above example, Niwa had achieved an additional 0.5 percentage point in vote share, due to random factors, he would have obtained the last PR seat at the expense of Sato; Niwa actually had a higher vote share than Sato. The reason he was not able to obtain the last PR seat is that the winner in Niwa's SMD did better than the winner in Sato's SMD. Had the winner of Niwa's SMD attained a $\frac{3}{4}$ percentage point lower vote share, or had the winner of Sato's SMD achieved a $\frac{3}{4}$ percentage point higher vote share, Niwa would have obtained the last PR seat instead of Sato. Thus, the winner of the last PR seat depended on at least four vote counts: Niwa's, Sato's, and those of the winners in their districts. Moreover, the identities of these four vote counts are only relevant conditional on the LDP's obtaining six PR seats and having four dual candidates with narrowness ratios higher than Sato's, both of which were uncertain before the election results were revealed.

The second source of discontinuity is close elections in SMD races. A narrow winner in one SMD could potentially change the representation of another district in the same PR block, because of its implications for the intraparty allocation of PR seats. This is because

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winners of SMD races vacate their positions on the party lists. To see this operating in reality, consider again the LDP's party list in Table 2. The SMD-losing candidate with the highest narrowness ratio at 0.976 was Fukushiro Nukaga from district Ibaraki 2. If for random reasons he had obtained an additional 1.2 percentage points in vote share, he would have won the SMD seat and vacated his position on the PR list. The last PR seat would have then gone to Yuya Niwa. In such a scenario, Nukaga's opponent, who would have lost the SMD race by a narrow margin, would have occupied a high ex post ranking on his party's PR list, potentially eliminating another SMD-losing candidate from that party. The outcome of a narrow election in SMD Ibaraki 2, though perhaps not consequential for its own representation, thus has a ripple effect on the representation of two other districts.

There is another source of discontinuity that can potentially be employed. Folke (2014) proposes a method of applying a regression discontinuity design in PR systems, exploiting the discontinuous jumps in the mapping of practically continuous vote shares to discrete seat shares. He then applies this method using Swedish municipal elections, which have a pure PR system, to study the effects of party representation on environmental, immigration, and tax policies. The benefit of exploiting such discontinuity in Japan's case is that it would provide an extra source of exogenous variation of effective representation due to the marginal change in PR seats obtained by a party, which could lead to the election (or non-election) of SMD-losing dual candidates from the affected parties. One cost, however, is that this strategy would introduce another layer of complexity, as such discontinuity rests on the particulars of the mapping from PR vote shares to the number of PR seats obtained by each party.

More importantly, interparty reallocation of PR seats may have wider political and public policy implications than intraparty reallocations of PR seats across districts. As shown by Folke (2014), assignment of a seat in the municipal legislature to parties with different agendas has large effects on local immigration and environmental policies. Inter-party reallocations of PR seats may also alter coalition formation, regional bargaining positions, public policy priorities, and so on. Exploiting this discontinuity, therefore, confounds the distributional consequences of different levels of effective representation and holds the partisan configuration of a legislature fixed. I focus instead on the cross-municipality variation of effective representation induced by intraparty assignment of PR seats.

3.2 A Sample of Districts with Quasi-Randomized PR Seats

To incorporate the two sources of discontinuity, consider the following thought experiments that create counterfactual assignment of PR seats. Due to random factors—for example,

weather conditions that affect voter turnout voters for candidates differentially on the election day—vote shares of the winner and runner-up in a particular SMD are slightly different. In particular, suppose ϵ vote share is shifted from one candidate to another. This may or may not affect the outcome of the perturbed SMD race.

If, under this counterfactual vote share profile, the allocation of representatives to districts via the PR system does not change, the district is not assigned to either the treatment or control sample. However, if a district with exactly one additional representative through the PR system loses it in the counterfactual, the district is tagged as randomly assigned to the treatment of having two effective representatives. If a district that has no additional de facto representative through the PR system gains one in the counterfactual, the district is tagged as randomly assigned to the control group of having a single representative. Counterfactual vote shares may result in changes in district representation due to either or both sources of discontinuity discussed previously.

To construct a sample of districts with quasi-randomly assigned treatment status, I simulate the above thought experiments for each SMD in each election, perturbing one SMD election at a time and holding everything else constant. I consider small vote share shifts from SMD winners to runners-up, as well as shifts in the opposite direction. The perturbations generate a set of treatment districts, which have exactly one PR representative but would lose it in a counterfactual, and a set of control districts, which have no PR representative but would gain one in a counterfactual. Note that a district may qualify for treatment status under different perturbations to different elections, but such districts are not double counted in the quasi-randomization sample.

Lee et al. (2004) study how the partisan affiliations of legislators affect legislative voting using close elections for the U.S. House of Representatives. They propose a simple, nonparametric RD estimate using close elections in which the margin of victory is less than 4% in the two-party vote share. In those elections, outcomes are considered to be as if random. Since vote share transfers of up to 2% between the two candidates are sufficient to alter the outcomes in these elections, I perturb the observed vote shares up to 2% to construct the quasi-randomized sample, i.e., $\epsilon \leq 0.02$.

I focus on the margin of having zero or one PR representative, so that districts in the quasi-randomized sample have identical and exactly one treatment status out of two, regardless of which thought experiment generates the treatment status. This avoids complexity arising from situations such as a district's having a treatment status at the 0–1 margin but a control status at the 1–2 margin. Moreover, it is so rare that a district could potentially gain two PR representatives that precise estimation at margins other than 0–1 is difficult. Furthermore, it should be noted that a given perturbation does not always generate treat-

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ment and control districts in pairs; it is possible that a vote share perturbation generates a treated district but not a control district and vice versa, because a dual candidate may gain or lose a seat to a pure PR candidate.

Table 3: Number of Single-Member Districts by the Number of PR Representatives

		Full Sample				Quasi-Randomized Sample		
	No Dual	# PR Rep.				# PR Rep.		
Election	Candidate	0	1	2	Total	0	1	Total
1996	12	223	70	7	300	36	27	63
2000	5	227	67	6	300	50	27	77
2003	3	184	112	4	300	46	60	106
2005	0	185	113	2	300	47	39	86
2009	0	206	91	3	300	75	31	106
2012	2	185	105	10	300	37	34	71
Total	22	1210	558	32	1800	291	218	509

Notes: The table above shows the number of districts by the number of PR representatives elected from the districts. The first column indicates the general election. The left panel tabulates the number of PR representatives in the full sample after each election. The right panel tabulates the number of PR representatives in the quasi-randomized sample, as detailed in Section 3.2.

Table 3 shows how many SMDs have additional representatives after each election, in both the full sample and the quasi-randomized sample. Out of the 1,800 SMD races in the six elections, 509 SMD races (28%) are included in the quasi-randomized sample. In the full sample, one-third of the SMDs would have at least one PR representative. In less than 2% of SMD elections, two losing candidates were elected to PR seats. In the quasi-randomized sample, 291 SMD races (57%) are assigned to the control group of no PR representative and 218 SMD races (43%) are assigned to the treatment group of having one PR representative.

To check whether the constructed quasi-randomized sample has close to random assignments of treatment status (i.e., having a PR representative or not), I examine the correlations between treatment status and a list of demographic and political variables at the municipality level and at the district level. At the municipality level, demographic variables include log population, shares of different age groups, population growth rate, log income per capita, and municipal expenditure per capita. I regress the municipal demographics variables in the year before the election and year indicators. At the district level, I regress the number of candidates, the number of dual candidates, the share of female candidates,

the average age of candidates, and the share of incumbent candidates on the treatment indicator and year indicators.

Table 4: Balancing Tests

	Coeff.	S.E.	Mean	S.D.	Obs.
Municipal Demographics					
Population (log)	-0.034	(0.067)	11.838	1.169	2930
Age up to 4 (share)	0.000	(0.001)	0.045	0.007	2930
Age 5 to 19 (share)	0.001	(0.001)	0.147	0.019	2930
Age 20 to 44 (share)	-0.004	(0.004)	0.337	0.046	2930
Age 45 to 64 (share)	0.002	(0.002)	0.276	0.018	2930
Age 65 or Elder (share)	0.000	(0.003)	0.195	0.048	2930
Population Growth	0.001	(0.002)	0.004	0.018	2887
Income per capita (log)	-0.029	(0.019)	0.370	0.249	2927
Expenditure per capita (log)	0.002	(0.013)	-0.987	0.287	2930
SMD-Level Characteristics					
Number of Candidates	-0.028	(0.087)	3.892	0.989	509
Number of Dual Candidates	0.052	(0.078)	2.314	0.768	509
Share of Female Candidates	-0.022	(0.017)	0.127	0.171	509
Average Age of Candidates	0.558	(0.514)	50.141	5.402	509
Share of Incumbent Candidates	-0.016	(0.017)	0.356	0.187	509

Notes: All regressions include year fixed effects. Standard errors in parentheses are clustered two-way by prefecture and by election-block.
* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 4 reports the results of these placebo tests. As in the main estimates to be presented in the next section, standard errors are clustered two-way by prefecture and election-block. The treatment indicator does not significantly predict any pre-treatment demographic variables at the municipality level or contemporary political variables at the district level at the 10% level.

4 PR Representative and Public Expenditure

4.1 Municipal Public Expenditure

To estimate the effect of having an additional de facto representative through the PR system on public expenditure, my main specification is:

$$y_{it} = \alpha + \delta PR_{it} + X'_{it}\beta + \mu_i + \pi_t + \epsilon_{it} \tag{1}$$

where y_{it} is the log public expenditure per capita for municipality i in fiscal year t; PR_{it} is the number of PR representatives municipality i has for fiscal year t; X_{it} is a vector of demographic and economic controls; μ_i is a municipal fixed effect; and π_t is a year fixed effect.

A municipality is typically much smaller than an SMD in population except for the largest cities, such as Osaka, which span several districts. We dropped Japan's largest cities that span multiple districts. In our sample, therefore, PR_{it} varies at the district level, which typically contains one or more municipalities. To avoid extra notation, we omit indexing SMD in the equation above.

PR_{it} is determined by the latest election before the start of fiscal year t. Fiscal years in Japan start on April 1st. The 2000 general election took place on June 25th, 2000. All other elections in our sample took place in the second half of the calendar year. Our results are qualitatively similar if we define PR_{it} alternatively for fiscal years with an election in the middle. In particular, I obtain very similar results if I take the value of PR_{it} at the beginning and end of a fiscal year, transform the binary PR_{it} to a potentially fractional variable by apportioning the fiscal year based on the days under which PR_{it} was determined by the previous election and days under which the election in the middle of the fiscal years determined PR_{it}.

To allow for contemporary and time-series correlation of error terms within a prefecture, I cluster the standard errors two-way by prefecture and by election-PR-block. The two-way clustering robust standard errors also allow for correlation of the error terms within a PR block over a parliamentary term. There are 47 prefectures and 66 election-blocks. In all regressions reported in this section, municipality-year observations are weighted by the municipal population.

For comparison, the left panel of Table 5 shows the estimates of the above specification using the full sample. If whether a municipality has a PR representative only correlates with time-invariant municipal or district characteristics, then the inclusion of municipal fixed effects affords us a causal interpretation of δ. There is substantial within-municipality

variation in having a PR representative. This variation is still visible after aggregating to the prefecture level.

Figure 4 is a heat map that illustrates treatment intensity at the prefecture level over our sample years. In the heat map, a row indicates a prefecture and a column indicates a fiscal year. The intensity of the red cells indicates the share of districts having a PR representative in the corresponding year. The horizontal side bar on the right shows the average number of districts in each prefecture.

Figure 4: Share of Districts with a PR Representative by Prefecture over Time: Full Sample
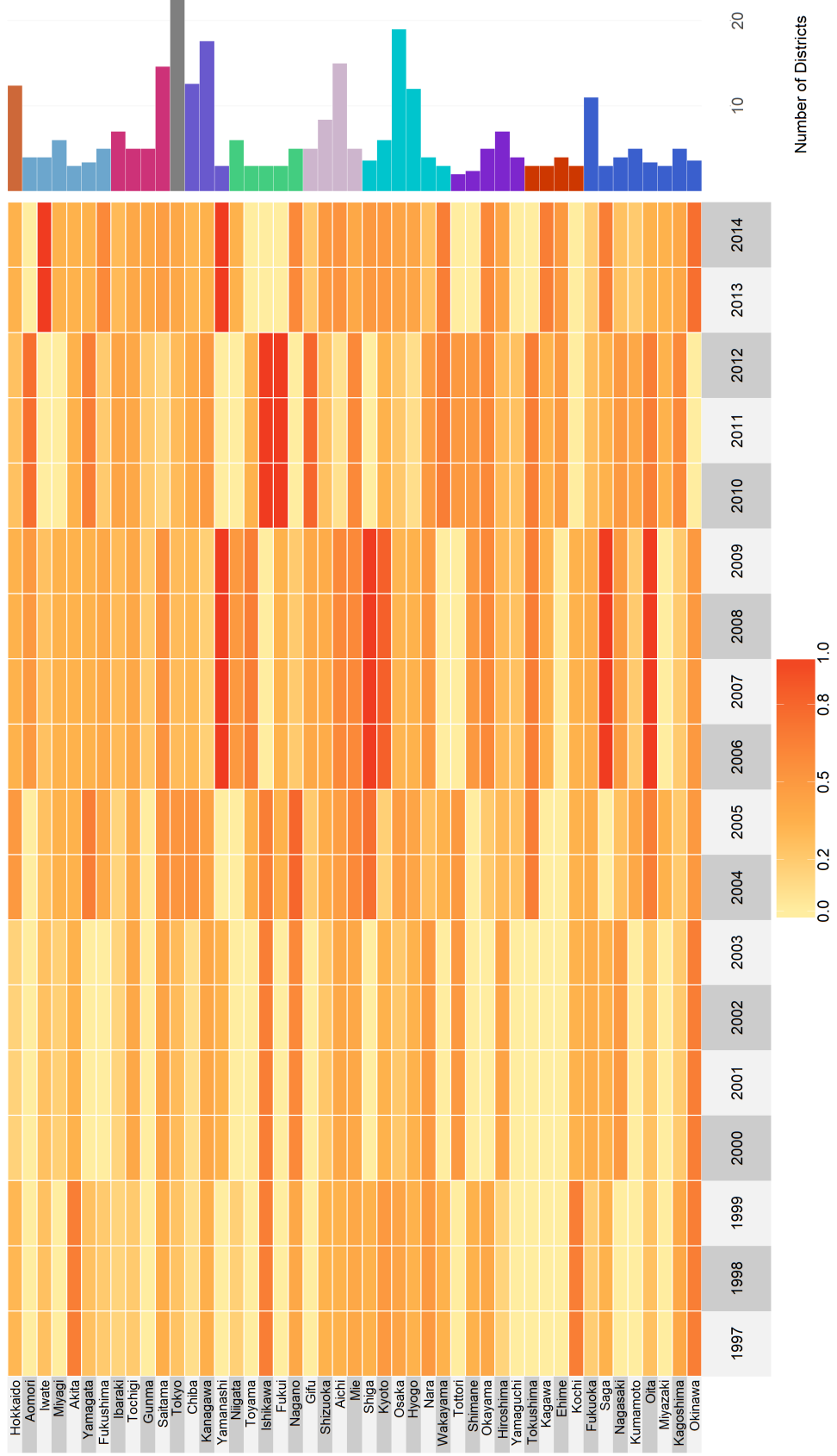
Notes: The heat map above illustrates treatment intensity at the prefecture level over our sample years. A row indicates a prefecture and a column indicates a fiscal year. The intensity of red cells indicates the share of districts having a PR representative in the corresponding year. The horizontal side bar on the right shows the average number of districts in each prefecture.

Table 5: Additional Representative and Local Public Expenditure

	Full Sample			Quasi-Randomized Sample		
	(1)	(2)	(3)	(4)	(5)	(6)
PR Representative	0.007*	0.006**	0.010***	0.013***	0.012***	0.014***
	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Population (log)		-0.084	-0.074		-0.030	-0.028
		(0.111)	(0.106)		(0.093)	(0.090)
Age up to 4 (share)		-5.455**	-5.590**		-3.406**	-3.423**
		(2.355)	(2.366)		(1.607)	(1.551)
Age 5 to 19 (share)		-1.021	-1.095*		-0.457	-0.509
		(0.672)	(0.654)		(0.702)	(0.722)
Age 20 to 44 (share)		0.015	-0.092		-0.284	-0.374
		(0.540)	(0.518)		(0.553)	(0.545)
Age 65 or Elder (share)		0.682	0.599		0.805*	0.732*
		(0.494)	(0.518)		(0.418)	(0.441)
Population Growth Rate (lag)		0.270**	0.263**		0.236**	0.228**
		(0.114)	(0.117)		(0.096)	(0.097)
Income per capita (log)		0.362**	0.352**		0.388***	0.384***
		(0.166)	(0.169)		(0.105)	(0.104)
Vote Share of SMD Winner			0.089*			0.094
			(0.047)			(0.073)
Vote Share of SMD Runner-up			0.013			0.035
			(0.025)			(0.100)
Observations	37,939	37,939	37,939	9,399	9,399	9,399

Notes: All regressions include municipal and year fixed effects. Municipality-year observations are weighted by the municipal population. Standard errors in parentheses are clustered two-way by prefecture and by election-block.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

In Column (1) of Table 5, I reported the estimate of δ using a simple specification with only municipal and time fixed effects. Having a PR representative increases municipal public expenditure by 0.7%, which is statistically significant at the 10% level. To control for time-varying factors that may correlate with electing a PR representative and municipal public expenditure, I include a number of municipal demographic variables in Column (2). These variables include log population, a set of variables that measure the age profile of the municipal population, population growth rate, and per capita taxable income. I obtain a more precise estimate of 0.6%, which is significant at the 5% level. In Column (3), I further add two electoral variables to control for potential confounding effects of electoral competition. Including the vote shares of district winners and the runners-up increases the estimate to 1%, which is significant at the 1% level.

The full-sample estimates may be biased if there are time-varying factors that correlate with both having a PR representative and municipal expenditure. For example, an SMD representative may be unable to bring much-needed public work to his district. As a result, his supporters switch to alternative candidates, resulting a higher narrowness ratio for the runner-up. In this scenario, the omitted factor of municipal expenditure may negatively correlate with having a PR representative, and the full-sample estimates may be biased downward.

On the other hand, if a powerful dual candidate could ensure his election to a PR seat by occupying a singular ex ante rank on top of a party list and bring public projects to the district, then this omitted factor positively correlates with both having a PR representative and municipal expenditure. The full-sample estimate may be biased upward.

Estimates from the quasi-randomized sample do not suffer from these potential biases. In the conventional sharp RD design, the identification assumption is that the forcing variable and the potential outcomes are continuously distributed, while the treatment status discontinuously changes at a known threshold. My identification assumption is similar, except that the forcing variables are no longer a single scalar, but instead a vector of SMD vote shares, and the mapping from the forcing variables to the treatment status depends on a large set of electoral variables. However, the mapping of the forcing variables to treatment status remains deterministic and includes sharp discontinuities.

In the quasi-randomized sample, there is also substantial variation in PR treatments within a municipality. Figure 5 is similar to Figure 4 in tabulating the treatment intensity with a heat map.

Figure 5: Share of Districts with a PR Representative by Prefecture over Time: Quasi-Randomized Sample
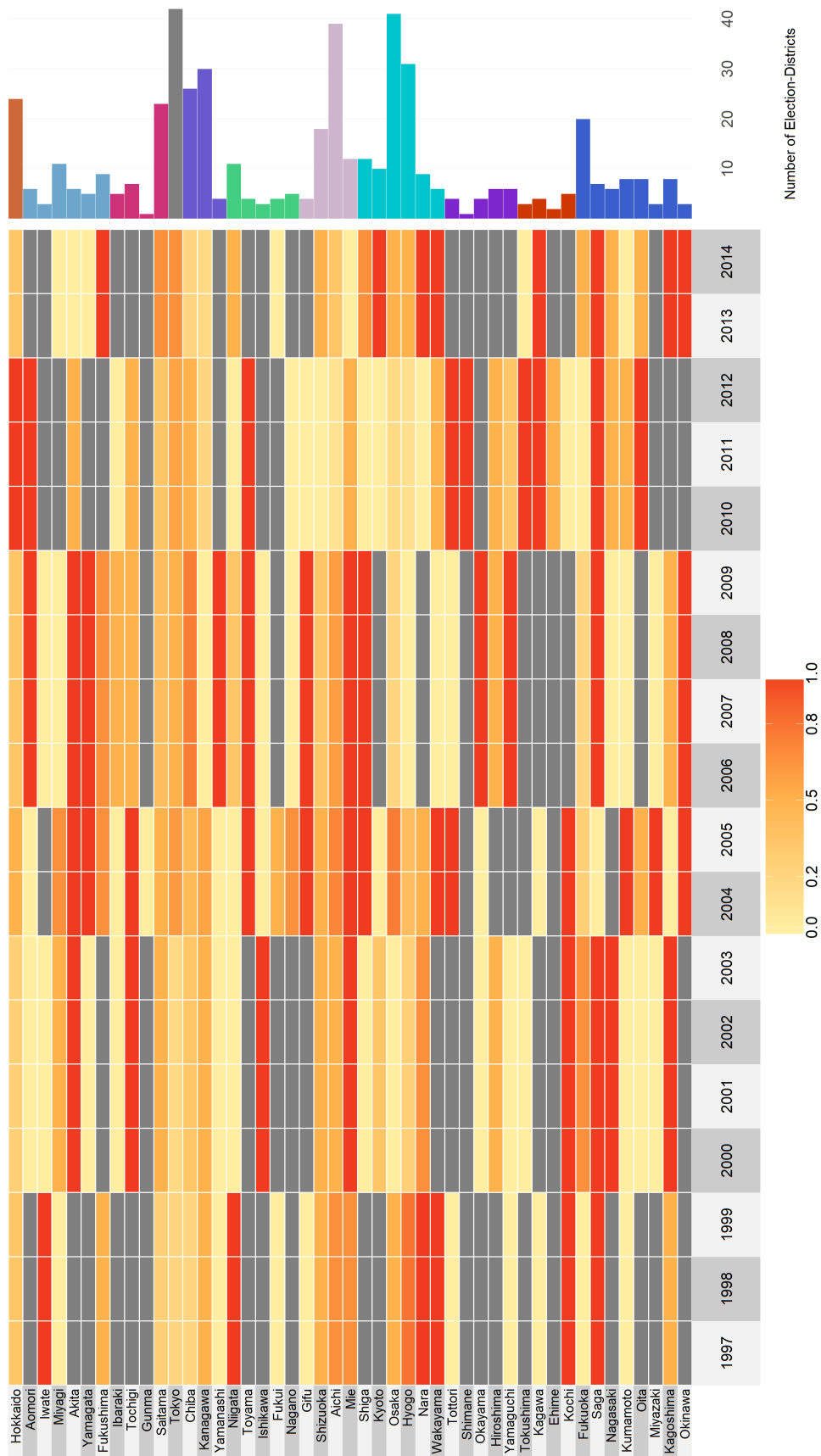
Notes: The heat map above illustrates treatment intensity at the prefecture level over our sample years in the quasi-randomized sample of districts. A row indicates a prefecture and a column indicates a fiscal year. The intensity of red cells indicates the share of districts having a PR representative in the corresponding year. Prefecture-years without a district in the quasi-randomized sampled are colored gray. The horizontal side bar on the right shows the number of election-districts for each prefecture in the quasi-randomized sample.

But instead of using the full sample, Figure 5 focuses on the quasi-randomized sample of districts. Prefectures without a district in the quasi-randomized sample in a year are colored gray. Also, the side bar on the right represents the number of election-districts rather than the number of districts.

Columns (4) to (6) of Table 5 report estimates from the quasi-randomized sample. Columns (4) to (6) are similar to Columns (1) to (3), respectively, in their inclusion of control variables. Depending on specifications, the estimates of having a PR representative on municipal expenditure range from 1.2% to 1.4% and are all significant at the 1% level. With the quasi-randomized sample, inclusion of time-varying control variables is not necessary for our identification. However, they may increase estimation precision. In particular, the vote shares of SMD winners and runners-up may mitigate finite sample biases.

However, none of these vote share variables are statistically significant. The relative stability of estimates from the QR sample compared to those from the full sample is consistent with the possibility that omitted variables biases may be a concern in the full sample, but unlikely so in the quasi-randomized sample. However, since an RD estimate only estimates a local average treatment effect (LATE), I cannot determine whether the difference of estimates between the full sample and the quasi-randomized sample is due to endogeneity issues with the full-sample estimate or the difference between the LATE and the average treatment effect.

Notice that in the quasi-randomized sample, the treatment variable is binary—namely, a municipality either has no PR representative or one PR representative. The magnitude of the estimated treatment effect is modest. Having a PR representative increases municipal expenditure by 1.4%, which is similar to the increase in municipal expenditure associated with 4% higher income per capita.

4.2 Infrastructure, Welfare, and Government Payroll

While having an additional de facto representative increases total municipal public expenditure by about 1.4%, the extent to which this represents an increase in discretionary spending is unclear. The Ministry of Finance classifies spending into three types: discretionary spending, compulsory spending, and other. Discretionary expenditures are mainly on public infrastructure. Compulsory spending consists of debt service, wages and salaries of government employees, and welfare spending. Nationwide, public works expenditure accounts for about 15% of total municipal expenditure. Welfare spending and government payroll account for 15% and 19%, respectively.

Table 6 shows the estimated impacts of having an additional representative, respectively,

on per capita municipal expenditure on public works, welfare, and payroll. Estimates from the quasi-randomized sample suggest that an additional representative increases public works spending by as much as 6%, but has no significant effect on welfare spending by the municipal governments. Municipal governments in Japan are responsible for the bulk of welfare spending, but have little authority in setting welfare policies. The scope, eligibility criteria, and payment standards for welfare are set by the national government in a fairly uniform manner, though with some regional adjustments reflecting variations in the cost of living. Moreover, having an additional representative does not have significant effects on the payroll of municipal employees. In addition, in unreported results, I do not find any significant effect on the numbers of temporary or permanent government employees. This result suggests that higher expenditure is not driven by patronage spending through government employment.[7]

Table 6: Additional Representative and Local Public Expenditure by Type

	Infrastructure		Welfare		Gov. Payroll	
PR Rep.	0.042**	0.058**	-0.000	0.004	0.003	-0.001
	(0.019)	(0.028)	(0.005)	(0.007)	(0.003)	(0.005)
Full Sample	✓		✓		✓	
Quasi-Randomized Sample		✓		✓		✓
Observations	22,943	6,397	22,943	6,397	22,943	6,397

Notes: All regressions include municipal and year fixed effects. Municipality-year observations are weighted by the municipal population. Standard errors in parentheses are clustered two-way by prefecture and by election-block.
* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

5 Electoral Competition and Distribution of Spending

5.1 Heterogeneous Treatment Effects within SMDs

PR representatives nominally represent the PR block that elects them. As Figure 3 shows, however, they have electoral incentives to cultivate popular support in the districts in which they compete. Having a PR representative may increase local public spending through two channels, which are not mutually exclusive. First, municipalities that strongly support the runner-up may receive more resources from the national government when their preferred

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[7]Prior to civil service reforms, governing parties in many U.S. states used patronage to maintain control (Folke et al., 2011). Local civil servants in Japan are typically recruited through competitive examinations.

candidate is elected to a PR seat than they would have otherwise. In other words, the election of their favored candidate affords these municipalities de facto representation in the national government, which translates to greater local public spending.

Moreover, a second incumbent weakens the electoral advantage of the SMD representative, intensifying electoral competition in the district. Greater electoral competition has been found to make governments more responsive to constituency needs in India (Besley and Burgess, 2002). Incumbent candidates typically have electoral advantages over non-incumbents, such as name recognition and access to party networks. Importantly, incumbent candidates could bargain in the legislative process and lobby bureaucrats for greater public spending in their constituencies. Therefore, incumbents typically enjoy substantial electoral advantages (Lee, 2008; Erikson and Titiunik, 2015; Dano et al., 2022).[8] Excessive incumbency advantages provide the incumbent with weak incentives to work for the public good. For example, Besley et al. (2010) find that the lack of political competition in the U.S. South from Reconstruction to the 1960s hindered economic growth. A district with a PR representative, therefore, may benefit from intensified electoral competition.

In this section, I investigate how having a PR representative may differentially affect municipalities across a district. A large literature studies the distributive politics of public spending. Theories and empirical findings have been mixed on whether swing areas and core areas with loyal supporters benefit from electorally motivated public spending.[9] To see how having a PR representative affects municipalities with different leanings, I extend the specification in Eq. (1) by interacting the indicator of PR representative with municipal margin or vote shares. Table 7 reports the estimates, in which total municipal expenditure or infrastructure expenditure is the dependent variable.

In particular, I first interact the absolute value of municipal margin of the SMD winner over the runner-up. Unlike the district-wide margin, which I also control for, the municipal margin could be negative. If swing municipalities are targeted, the coefficient of the absolute value of municipal margin or its interaction with the PR indicator should be negative. As reported in Column (1) of Table 7, the estimated coefficient is indeed negative, but it is not precisely estimated. The interaction term is positive, however, which suggests that having a PR representative does not reinforce the tendency, if any, to target swing municipalities.

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[8]In a model in which voters are able to discipline politicians and select better candidates to a certain extent, some incumbency advantage in re-election naturally arises (Besley, 2007). Indeed, in some electoral democracies with weak political accountability and poor governance, incumbents enjoy few incumbency advantages or even incumbency disadvantages (Uppal, 2009; Klašnja, 2015; Klašnja and Titiunik, 2017; Hahn et al., 2018). However, entrenched politicians may enjoy excessive incumbency advantages through gerrymandering, control of mass media, etc.

[9]See Golden and Min (2013) for a review of this literature.

Incumbents may instead target extra spending on municipalities with a large share of their supporters. Incumbents may also target their supporters due to ideological affinity or to mobilize them to turn out to vote. In our context, when there is a PR representative, a problem of credit attribution on the part of voters may also drive incumbents to favor their core supporters. While SMD and PR representatives share the same set of swing municipalities, they have distinct sets of municipalities that strongly support them. Voters in municipalities that strongly lean toward one incumbent should be able to more easily infer which incumbent should take credit for lobbying efforts that lead to higher municipal spending.

In the specification whose estimates are reported in Column (2) of Table 7, I include two variables, MV_1 and MV_2, and their interactions with the indicator of a PR representative, where MV_1 and MV_2 are the municipal vote shares of the SMD winner and SMD runner-up over their district-wide vote shares, respectively. One may expect that MV_1 and MV_2 are negatively correlated. They are. However, because of the existence of third candidates and their uneven distribution of support across municipalities, correlation of MV_1 and MV_2 is far from perfect. As shown in Figure 6—a two-dimensional heat map plotting the joint distribution of MV_1 and MV_2—there are a large number of municipalities in which MV_1 and MV_2 do not add up to zero.

In the absence of a PR representative, municipalities that vote heavily for the SMD winner or runner-up enjoy significantly less public spending. A one standard deviation higher municipal vote share for the SMD winner (9 percentage points) is associated with about 2% lower municipal expenditure. One standard deviation higher municipal vote share for the runner-up (8.4 percentage points) is associated with 1.5% lower municipal expenditure. This suggests that municipalities that lean strongly for SMD winners are not favored with additional government spending in the absence of a PR representative.

However, in the presence of a PR representative, municipalities that vote heavily for the SMD winner or runner-up enjoy significantly more public spending than when there is no PR representative. All four coefficients of MV_1, MV_2, and their interactions with the PR indicator are significant at the 1% level. Municipalities with one standard deviation higher vote share for the runner-up enjoy 3.6% higher municipal expenditure when the runner-up is elected to a PR seat.

Table 7: Municipal Political Leaning and Public Expenditure with and without a PR Representative

	Total Expenditure			Infrastructure Expenditure		
	(1)	(2)	(3)	(4)	(5)	(6)
PR Representative	0.007	0.011**	0.010**	0.018	0.060**	0.037
	(0.007)	(0.005)	(0.005)	(0.053)	(0.028)	(0.037)
PR Rep. × |MM|	0.030			0.222		
	(0.064)			(0.319)		
|Municipal Margin (MM)|	-0.077			-0.504		
	(0.048)			(0.314)		
PR Rep. × Municipal Vote Share of SMD Winner		0.415***	0.410***		1.324*	1.163*
		(0.143)	(0.142)		(0.693)	(0.694)
PR Rep. × Municipal Vote Share of SMD Runner-up		0.421***	0.417***		0.466	0.347
		(0.141)	(0.141)		(0.921)	(0.890)
Municipal Vote Share of SMD Winner		-0.215**	-0.212**		-0.655	-0.542
		(0.087)	(0.086)		(0.601)	(0.602)
Municipal Vote Share of SMD Runner-up		-0.173***	-0.170***		0.011	0.125
		(0.056)	(0.056)		(0.639)	(0.611)
Victory Margin of SMD Winner	0.026			-0.067		
	(0.065)			(0.391)		
Vote Share of SMD Winner			-0.015			-0.108
			(0.079)			(0.600)
Vote Share of SMD Runner-up			0.032			0.781
			(0.094)			(0.489)
Observations	8,311	8,311	8,311	5,311	5,311	5,311

Notes: All regressions include municipal and year fixed effects. Municipality-year observations are weighted by the municipal population. Standard errors in parentheses are clustered two-way by prefecture and by election-block.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Figure 6: Density of Municipal Vote Shares of SMD Winner and Runner-up
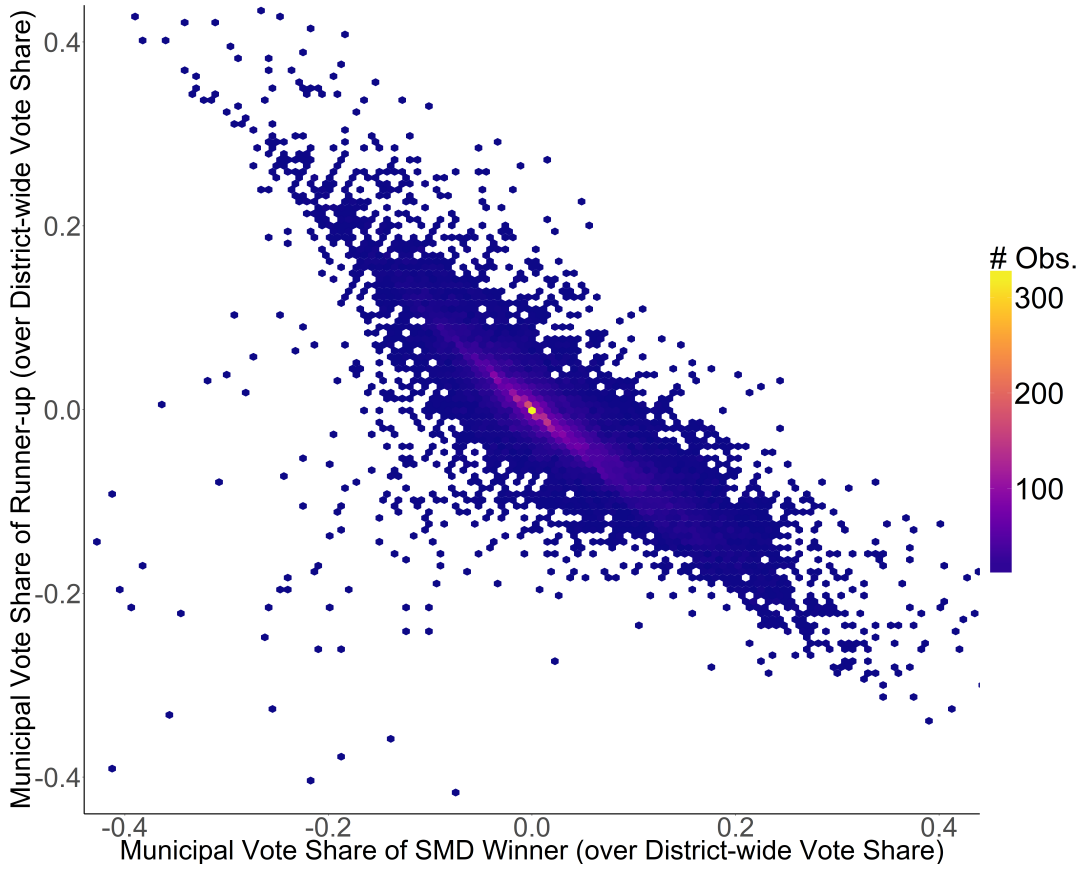
Notes: The two-dimensional heat map above plots the joint distribution of MV_1 and MV_2, where MV_1 and MV_2 are the municipal vote shares of the SMD winner and SMD runner-up over their district-wide vote shares, respectively.

Moreover, these municipalities also have higher municipal expenditure than municipalities whose vote share for the runner-up is equal to the district-wide vote share when the runner-up is elected to a PR seat. Interestingly, municipalities that lean heavily toward SMD winners also experience higher municipal expenditure when there is a PR representative. This suggests that the intensified electoral competition motivates SMD incumbents to provide greater public spending to core supporters.

In Column (3), I control for the vote shares of the SMD winner and the runner-up. Both estimates of the two variables are small and statistically insignificant. Moreover, their inclusion has little impact on the coefficient estimates of the municipal vote shares and their interactions with the PR indicator.

Columns (4) to (6) are similar to Columns (1) to (3), respectively, in the inclusion of explanatory variables, but report estimates in which log per capita infrastructure expenditure

is the dependent variable. The signs of all but two estimates in Columns (4) to (6) are the same as those in Columns (1) to (3). The coefficient estimates are typically larger but are not precisely estimated, which likely reflects the smaller sample size and larger volatility of infrastructure expenditure compared to other nondiscretionary expenditure.

One should interpret the results in this section with caution. The causal interpretation of estimates reported in Table 7 requires stronger assumptions than those reported in the previous section due to the introduction of interaction terms and related controls. While municipal fixed effects control for time-invariant municipal characteristics that may be confounding, causal interpretation of the estimates here also requires sequential exogeneity of municipal vote shares or margin. These electoral variables, which were pre-determined by the latest election prior to the start of fiscal year t, need to be uncorrelated with the error term at time t. Such sequential exogeneity condition could be violated if, for example, voters in a municipality anticipate shocks to municipal public spending and vote in a way that affects the municipal vote shares and margins of the two main candidates. However, perhaps one could have some assurance that the omitted variables may not be a serious concern from the fact that results from the full sample and the quasi-randomized sample point in the same direction in Table 5.

5.2 Electoral Competition

To investigate how a PR representative affects the electoral competition, I examine how electing a PR representative affects the probability of election and running again for the SMD seat. Using the quasi-randomized sample of districts, I estimate the following logit model:

$$\text{Prob}(Y_{j,t+1} = 1) = \lambda + \gamma PR_{jt} + X'_{jt}\phi + \nu_t \tag{2}$$

where $Y_{j,t+1}$ is a binary variable indicating whether candidate j runs for the SMD again, being elected to any seat, being elected to an SMD seat, or being elected to a PR seat in the next election at time $t + 1$. PR_{jt} is a binary variable equal to one if candidate j's district elected a runner-up to a PR seat in the election at time t. X_{jt} is a vector of control variables including the vote share of SMD winners, the vote share of SMD runners-up, and a set of binary variables indicating the number of candidates in the SMD race. ν_t is an election fixed effect. λ, γ, and ϕ are coefficients to be estimated.

Using the same set of explanatory variables in Eq. (2), I also estimate the effects of a PR representative on the vote share of candidate j, conditional on running again in the next election using OLS. I estimate the specification separately for SMD winners and SMD runners-up, and plot the estimates on the left and right subplots, respectively, in Figure 7. I

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also plot the associated 95% confidence intervals using standard errors clustering by SMD, which allows for time-series correlation in the residual terms.

Figure 7: The Effects of Electing a PR Representative on the Electoral Prospects of Winners and Runners-up
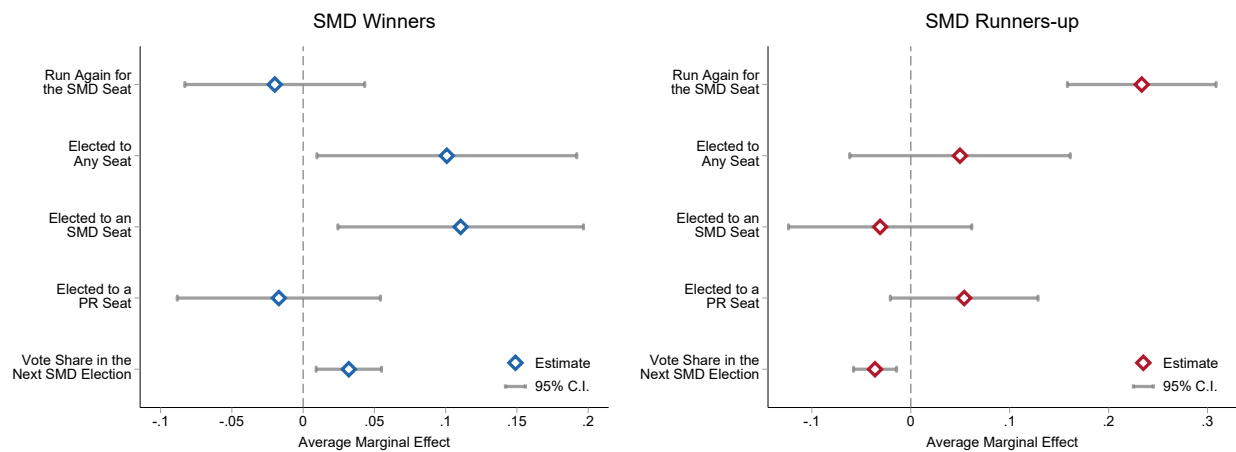
Notes: The figure above plots the estimated marginal effect of having a PR representative on the electoral decisions or outcomes in the following election for SMD winners (left subplot) or runners-up (right subplot). The first four binary outcomes are modeled with logit specifications, and vote share outcomes are estimated with OLS. Capped gray bars indicate 95% confidence intervals.

Being elected to a PR seat increases the chance that a runner-up will run again for the SMD seat in the next election by 25%, which is significant at the 1% level. However, the additional incumbent contestant does not seem to deter the SMD incumbent from running again. The estimated effect is negative but small, and statistically insignificant.

Interestingly, however, having a PR representative increases an SMD incumbent's chance of election in the next election by 10%, which is statistically significant at the 5% level. The increase in re-election probability is driven by the increase in re-election to SMD seats. Vote shares of SMD incumbents conditional on running in the next election is 3 percentage points higher and significant at the 5% level.

For runners-up, election to a PR seats does not affect their chance of election to the SMD in the next election. Election to a PR seat is 5% higher, but it is not statistically significant. Vote shares of runners-up conditional on rerunning are 4 percentage points lower for runners-up elected to a PR seat.

One should be cautious and not interpret the estimates of future vote share as causal. Even if PR seats are assigned randomly, potential electoral outcomes conditional on future participation are not independent of treatment assignment (Lee, 2009; Anagol and Fuji-

wara, 2016; Granzier et al., forthcoming). Being elected to a PR seat has a positive effect on the runner-up's probability of running again that is not homogeneous over their past popularity. I extend the logit model of rerunning probability by interacting the PR seat treatment with the runner-up's vote shares.

The top-left subplot of Figure 8 plots the average marginal effect of being elected as a PR representative against the runner-up's vote share margin behind the SMD winner. For runners-up who lost SMD seats narrowly, being elected to a PR seat has a small and statistically insignificant effect on rerunning probability. However, for runners-up who are far behind SMD winners, being elected to a PR seats has a large, positive, and statistically significant effect on rerunning.

Figure 8: The Effects of Electing a PR Representative on the Next SMD Election
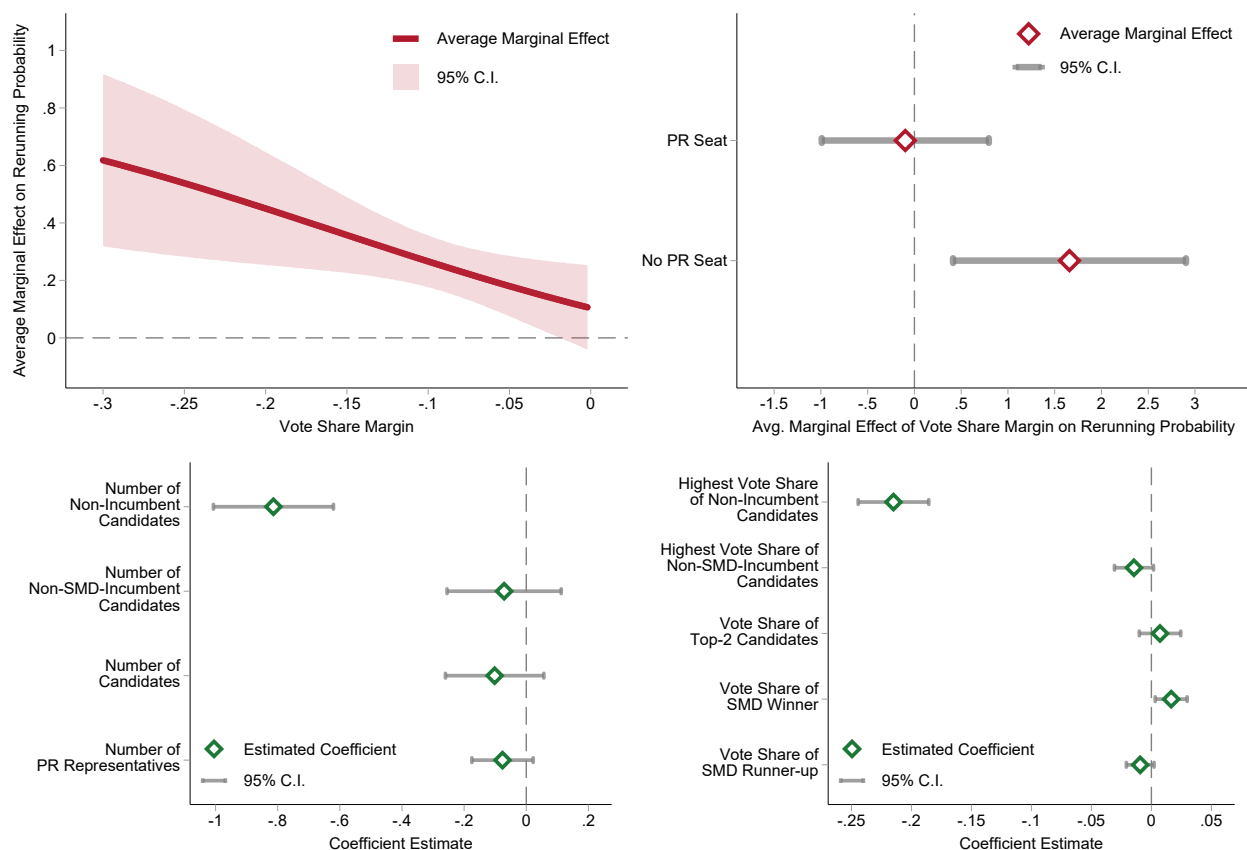
Notes: The top-left subplot plots the average marginal effect of being elected as a PR representative against the runner-up's vote share margin behind the SMD winner. The top-right subplot plots the average marginal effect of vote share margin on rerunning probability with and without a PR seat respectively. Capped gray bars indicate 95% confidence intervals.

The top-right subplot of Figure 8 provides an alternative way to see the heterogeneous

treatment effect on running again. For runners-up without a PR seat, the average marginal effect of vote share margin on rerunning probability is significantly positive. For runners-up with a PR seat, the average marginal effect is close to zero and statistically insignificant.

The presence of a PR incumbent may deter the entry of challengers. I regress the numbers of different types of candidates and the vote shares of various candidates in the next election on a binary variable indicating the presence of a PR representative, controlling for other variables as in the earlier logit regression. The bottom subplots show the estimated coefficients of the PR indicator. In the bottom left subplot, candidate counts are the dependent variables. In the bottom right subplot, vote shares in the next election are the dependent variables.

With a PR incumbent, on average, 0.8 fewer non-incumbent candidates enter an SMD race. Given the probability that a PR representative runs again in the SMD is 0.86, I could not reject that the PR incumbent's running in the election deter fully a new challenger. Having a PR representative has negative but statistically insignificant effects on the number of non-SMD-incumbent candidates, the total number of candidates, and the number of elected PR representatives in the subsequent election.

Since PR incumbents deter the entry of challengers, the highest vote share of non-incumbent candidates is more than 20 percentage points lower, which is significant at the 1% level. Some potential competitive challengers may have been deterred by the presence of a PR incumbent. The highest vote share of non-SMD incumbent candidates is slightly lower, which is significant at the 10% level. The vote share of SMD incumbent in the next election, conditional on rerunning, is 1 percentage point higher and statistically significant at the 5% level. The vote share of SMD runners-up in the next election, conditional on rerunning, is not significantly affected by election to a PR seat. The vote share of the top-two candidates in the next election is also unaffected by the presence of a PR incumbent.

Since the SMD winner has already defeated the runner-up once, it is not surprising that the former would defeat the latter in the subsequent election in the absence of a large electoral shock, such as a scandal. However, candidates who are potentially threatening to the SMD incumbent may have been deterred by a PR incumbent, who would be the presumptive nominee of his/her party. Moreover, as discussed in the last section, the SMD incumbents likely have also responded to the increased public spending lobbied for by the PR incumbents by increasing public spending targeted toward their core supporters. Therefore, the presence of another incumbent competing for the SMD seat ends up not having a negative impact on the SMD incumbent's re-election likelihood.

Ranks serve as a powerful coordinating signal. In simple plurality systems, being a runner-up increases a candidate's chance of re-running and winning in the next election

(Anagol and Fujiwara, 2016). In France's two-round elections, candidates who obtain first place in the first round are more likely to run in the second round than those close second (Granzier et al., forthcoming). The effects of first-round ranks are even stronger for those further down the ranks, e.g., ranked second as compared to ranked third. Dano et al. (2022) also find similar effects of ranks on re-running probability in subsequent electoral cycles. The empirical patterns documented in this section echo these findings on how salience and visibility affect electoral participation and dynamics. The salience and visibility of a PR seat is arguably even stronger such that it suppresses the correlation of past performance in the SMD and running probability in the SMD race in the following election cycle.

In these simple plurality or runoff systems, non-top ranks facilitate coordination among challengers and their supporters to challenge the incumbents. Under Japan's electoral system, however, the PR incumbents preempt the entries of potentially serious challengers for the SMD seats. The results in this section resonate with Besley et al. (2017) finding that career concerns and the entrenchment of local political elites in Sweden hinder the selection and promotion of desirable candidates.

Ranks in Sweden and Brazil's (semi-)open party lists are also salient and instrumental in intraparty organization, such as promotion and appointment to leadership positions (Folke et al., 2016). Folke et al. (2016) also find that the preference votes complement, rather than substitute, other selection criteria, such as competency, and likely have introduced individual accountability where a party dominates the electoral landscape. To the extent that the SMD votes allow voters to express their preferences over candidates on a party list and that these votes affect ranking within a party list, SMD votes are akin to preference votes and, at the margin of the last PR-seat for a party, determine election to PR seats. In Japan's mixed-member system, however, the resulting incumbency led to preemption in participation in the future SMD races and deterrence of potential challengers in those races.

6   Concluding Remarks

In Japan's mixed-member electoral system, a candidate who fails to obtain a plurality of votes in a district may still be elected to a PR seat through a party list, giving her district two de facto representatives instead of one. By exploiting the electoral discontinuities in the allocation of PR seats for causal identification, I find that an additional representative, on average, increases municipal expenditure by 1.4% and infrastructure spending by 5.8%.

Municipalities that lean strongly toward PR representatives experience substantial increases in public spending. While PR representatives afford better representation for their

supporters within their districts, the linkages between single-member district seats and PR seats compromise the supposedly broad representation by PR representatives.

With the presence of a PR representative, municipalities that vote solidly for SMD incumbents also experience substantial increases in public spending, which suggests that SMD incumbents respond to electoral threats by increasing public spending in their strongholds. Small single-winner districts in majoritarian systems are often thought to have an advantage in holding politicians individually accountable. However, the alternative route to an election—i.e., to the PR seat through a party list—may weaken electoral incentives by partially insuring failure in the SMD races for dual candidates in major parties. Moreover, the presence of PR representatives likely deters the entry of new and potentially successful challengers to SMD incumbents.

Anecdotes suggest that voters are not content with the weakening of accountability in the mixed-electoral system. In Japan, the election of a dual candidate to a PR seat is often called "PR resurrection," by which the PR-elected dual candidate is sometimes referred as a zombie MP, since he was brought back to (political) life after his (electoral) death in the SMD race (Pekkanen et al., 2006). In 1996, after the first election since the reform, some voters were surprised and angered that the candidates they voted against were somehow still elected to Parliament. Moreover, the voter turnout rates have remained low in Japan since the reform. The low turnout rates suggest that the reform has not succeeded in boosting public confidence in government.

Marx et al. (2022) find that electoral turnover of national governments, on average, leads to better economic performance, in part through more significant policy changes and better governance. The electoral rules investigated in this paper not only result in a distorted distribution of local public expenditure but may have also contributed to the entrenchment of political elites. While assessing the broader implications and overall efficacy is beyond the scope of this paper, my findings demonstrate that subtle features in a mixed electoral system may have unintended consequences on political discourse and public policy.

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