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LOCATION, LOCATION, LOCATION: SELECTING SITES FOR CONTROVERSIAL FACILITIES

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While a large literature exists on the siting of controversial facilities, few theories about spatial location have been tested on large samples. Using a new dataset from Japan, this paper demonstrates that state agencies choose localities judged weakest in local civil society as host communities for controversial projects. In some cases, powerful politicians deliberately seek to have facilities such as nuclear power plants, dams and airports placed in their home constituency. This paper then explores new territory: how demographic, political and civil society factors impact the outcomes of siting attempts. It finds that the strength of local civil society impacts the probability that a proposed project will come to fruition; the greater the concentration of local civil society, the less likely state-planned projects will be completed.

Keywords: Spatial location; controversial facilities; nuclear power plant; airport; dam; civil society; Japan; NIMBY.

1. Introduction

Siting controversial facilities remains a critical problem for industrialized and industrializing nations alike (Rabe, 1994; McAvoy, 1999; Lesbirel, 1998; Garcia-Gorena, 1999; Quah and Tan, 2002). Governments around the world seeking to construct new infrastructure such as liquid natural gas storage facilities, airports (Apter and Sawa, 1984; Altshuler and Luberoff, 2003) and waste incinerators face strong opposition. Previous work has sought to connect the choice of locations for such often-unwanted projects to minority concentration (Pastor, Sadd and Hipp, 2001), economic conditions (Mohai and Bryant, 1992) and political parties in power (Ramseyer and Rosenbluth, 1993). Despite progress in identifying potential explanations for siting heuristics, no consensus in the field exists (Atlas, 2001; Wolverton, 2002).

This paper builds on work by Hamilton (1993) and Clingermayer (1994) to test conventional explanations for spatial location along with the hypothesis that the strength of local civil society best predicts which geographically-appropriate localities are chosen for nuclear power plants, dams and airports. Using a new dataset from Japan with approximately 500 observations, a rare event logit (*relogit*) analysis provides evidence that the strength of local networks, more than alternative explanations, best determines locations for these projects.

I theorize that state authorities seek to avoid costly delays and conflict and locate unwanted projects in areas they believe will be acquiescent, or at least non-resistant, to proposed facilities. The paper then breaks new ground by demonstrating that areas with weaker local civil society are more likely to see proposed facilities come on line, while stronger ones have greater potential to block such projects.

The outline of the paper is as follows. Section 2 provides evidence that cases from Japan can provide insights into facility siting around the world. Section 3 reviews the relevant literature on facility siting, Section 4 explains the creation of and variables within the dataset, and Section 5 provides the results for the selection of sites for nuclear power plants, airports and dams in Japan. Section 6 investigates how the strength of civil society impacts the success or failure of siting attempts. Section 7 concludes with a summary of the findings, an interpretation of the results and an assessment of broader lessons.

2. Japan as a Representative Case

Japan provides an excellent setting for testing hypotheses about the factors critical in the siting of controversial facilities because of its high population density, variety of policy instruments used in handling siting, and differing levels of success at siting across facility types. Japan continues to grapple with high population density, with 30 times as many people as the US on every square kilometer of habitable land. Urban land prices in Japan skyrocketed over the post-war period due to the shortage of available space, and even after the bursting of the "bubble economy" of the 1990s land prices in Tokyo remain among the highest in the world. Given the scarcity of available land, Japanese government officials must work doubly hard at selecting sites. If Japanese officials cannot solve these problems and "pass the buck" to future generations, the costs for siting, negotiation and compensation will only rise. Their decision-making in selecting sites for nuclear power plants, dams and airports provides broader insights into other national and institutional contexts where issues of land scarcity and higher prices are beginning to surface.

A variety of different strategies are available to Japanese state agencies confronting the problem of siting public bads. Bureaus locate facilities through eminent domain, voluntary procedures involving compensation, education, public relations, and appeals to nationalism. The Japanese Agency for Natural Resources and Energy (ANRE) within the Ministry of International Trade and Industry (MITI), the Ministry of Construction (MOC) and the Ministry of Transportation (MOT) handle nuclear power plants, dams and airports, respectively.[1] While some ministries relied primarily on coercive methods, others adopted a full spectrum of soft social control strategies to reduce citizen opposition to planned projects. The cases under study here, therefore, reflect not just a single, dominant approach to siting, but rather a number of different state strategies for handling citizen opposition that can be found in the toolkits of other governments.

[1] In January 2001, the Ministries of Transportation and Construction were folded into the new Ministry of Land, Infrastructure and Transportation (MLIT), and MITI was renamed the Ministry of Economy, Trade and Industry (METI). These mostly cosmetic alterations do not impact the core arguments within this article.

Observers have been surprised at the success that Japan, the only nation in the world to have experienced nuclear weapons, experienced in its commercial nuclear reactor program, which supplies one-third of its electricity through 54 reactors. In recent decades, however, Japan, like the US, Germany, Italy and other advanced industrial democracies, has faced rising local opposition to nuclear plant facilities. Despite increasing subsidies, lead times for reactors, including negotiations with local communities, licensing and construction, have increased threefold over the past three decades (Aldrich, 2005a,b). Government energy plans have been scaled back in a number of areas, and recent public documents acknowledge the difficulties in achieving "local understanding" over plant siting. Further, Japan has experienced many non-nuclear land use conflicts, over issues including the construction of airports and high-speed rail lines (Apter and Sawa, 1984; Groth, 1987) and the placement of US military bases (Smith, 2000). Japan's successes and failures in facility siting must be explained, and not taken for granted. In short, as Lesbirel (1998) has argued, Japan provides an excellent window into how bureaucracies and decision makers around the world, pressed both for resources and available land, handle the problem of controversial facility siting.

3. Literature Review

In explaining the selection of sites for controversial facilities, past work has focused on six main factors: technocratic criteria, partisan discrimination, environmental racism, economic conditions, political intervention and civil society.

Government officials involved in choosing locations for such projects typically hold that **technocratic criteria**, such as aseismic bedrock, sufficient water supplies necessary for such facilities and distance to existing infrastructure, dictate sites. Technocratic criteria are non-political characteristics of the local landscape, and hence not a function of local demographic, economic or social conditions. Areas which meet the specified technical qualifications — the ability to withstand a strong earthquake, proximity to the electrical grid and transportation networks, and so forth — are ranked accordingly. Hence, a site immediately proximal to water located on strong bedrock and a short distance to the electricity grid would be higher ranked than one further from the ocean on weaker alluvial soil. Public officials, such as those in the Atomic Energy Commission in the United States and the members of Japan's Agency for Natural Resources, regularly defend their siting of projects on the basis of such neutral technical criteria (Morone and Woodhouse, 1989, p. 75; *Denki jigyō kōza henshū iinkai*, 1997, pp. 278–279; Quah and Tan, 2002, p. 19).

Theories of **partisan discrimination** highlight local political support for opposition or in-office parties. Researchers who adopt this approach argue that in one-party dominant systems, such as Japan, Mexico and Sweden, towns supporting the opposition party are punished with a higher concentration of public bads like nuclear power plants (Ramseyer and Rosenbluth, 1993, p. 129). Towns and villages with high support levels for Socialist or Communist members would be saddled with unwanted facilities as "payback" for their opposition to the dominant Liberal Democratic Party (LDP, the long-dominant ruling party in Japan). Communities which have been long-time supporters of the LDP would be expected to be free of such facilities. McGillivray (1997, p. 586) similarly argues that in high

discipline, majoritarian systems, "the government will inflict costs on party-loyal districts while providing protection to industries concentrated in marginal districts."

Proponents of the **environmental racism** argument, on the other hand, see controversial and unwanted facilities like nuclear power plants and airports located in clusters of ethnic, racial and religious minorities (Falk, 1982; Gould, 1986; Austin and Schill, 1991; Hurley, 1995; Pastor, Sadd and Hipp, 2001). Such landscapes center on disadvantaged groups who bear the brunt of public bads. In the United States, for example, numerous waste repositories and incinerators are found in communities with large populations of African-Americans, Native Americans and Hispanics (Bullard, 1994).

Another common explanation for the siting of public bads focuses upon the **economic conditions** in local communities. For example, small towns in rural North Carolina view prisons as public goods because of the jobs and other economic benefits (Hoyman, 2002), despite fears of jail breaks, riots and negative effects on the neighborhood. Others argue that we are likely to find facilities like industrial waste dumps and incinerators in communities with lower levels of income (Mohai and Bryant, 1992).

Some scholars would focus on clusters of powerful politicians to illuminate **political intervention**. Analysts have shown that both politicians and governmental authorities manipulate benefits and costs so that they fall out on specific constituencies within certain constraints. As "agenda setting [is] fundamentally biased in favor of those who possess the most resources" (Berry, Portney and Thomson, 1993, p. 103), more powerful, incumbent legislators can intervene to alter bureaucratic processes to focus costs and benefits on a locality-by-locality basis (Weingast, Shepsle and Johnsen, 1981, p. 643). Government bureaucrats at the Tennessee Valley Authority (TVA), for example, working to complete the planned Tellico dam, used political intervention to avoid being blocked by the discovery of an endangered fish in the local waters (Wheeler and McDonald, 1986, p. 212). Similarly, North Carolina politicians have intervened to bring prisons to their home constituencies when initial screening has not favored their home districts (Hoyman and Weinberg, 2006).

A final approach to siting revolves around **civil society characteristics**. Scholarship focuses on the relative strength of horizontal associations, the ties between individuals and the depth of shared norms. Research on siting in North America demonstrates that private developers avoid areas with higher potential for mobilization against their projects (Hamilton, 1993). Authorities recognize that tighter-knit, better connected communities can better overcome collective action problems. Similarly, local areas which are made up of more homogeneous constituents, i.e., areas with stronger horizontal bonds between citizens, are more likely to create zoning policies which exclude unwanted group homes than heterogeneous ones (Clingermayer, 1994). In communities with more social capital and better linkages, anti-facility groups find it easier to mobilize and organize against unwanted projects.

4. Dataset

This section contains information on the sampling methods used to create the dataset along with a description of proxies for civil society and political variables and descriptive statistics for the dataset.

To systematically evaluate patterns of public bads siting, I created a dataset of approximately 500 Japanese localities from 1955 to 1995 using a variety of sources (a list of which can be found in the Appendices). The dataset contains only localities which meet the geographical and geological criteria for siting, such as land which is both impermeable to water and resistant to seismic shocks (cf. Takada, 1954). A full or even random sample of some of the 3,000 villages and towns across Japan would not provide much insight into the problem, as we do not find nuclear power plants located in downtown Tokyo or Osaka, nor do we find airports on the tops of mountains. I filtered cases through a matching process to isolate the signal from noise using GIS (Geographic Information System) data to exclude sites on which administrators would not construct facilities because of loose soil, distance from water supplies or other geographic factors.

4.1. *Sampling methods*

I used an *equal-shares, choice-based* sampling method (see King and Zeng, 2001a,b; King *et al.*, 1994, Sec. 4.4.2) using politically defined localities (towns, cities and villages) as the unit of analysis to generate 475 observations. I deliberately selected observations to include the entire universe of facility host communities in which state agencies played a major role. By collecting observations where siting attempts for a nuclear plant, dam or airport occurred (but may or may not have been completed), along with carefully matched observations where no controversial facility was proposed but which still shared the same geographic, geologic and temporal characteristics, I achieved greater analytical power with fewer total observations.

The observations in my dataset where $Y = 1$ constitute the entire universe of attempted siting cases of nuclear power plants and airports in which the Japanese central government acted as an entrepreneur or founder of the project, and half of the dam cases where the state played a similar role (dam cases were selected at random). I chose airport, dam and nuclear power plant siting attempts because the Japanese and other national governments regularly face resistance when attempting to build these large-scale facilities. The balance of observations where $Y = 0$ (where no siting was attempted) and $Y = 1$ (where the government sought to locate a facility in the locality) within the dataset was approximately equal ($\hat{Y} = 0.494$), hence the label "equal shares".

I matched the set of cases where authorities attempted siting against those where no siting had occurred temporally, geographically and geologically. Analysts who build observational datasets without ensuring that their cases involve "apples and apples", as opposed to dissimilar subject samples, do so at their peril (Rosenbaum and Rubin, 1985; Reiter, 2000). In matching the observations where $Y = 0$, I followed the explicit decision heuristics of siting authorities according to both interviews and archival records. To assist me in selecting cases where no siting attempt had occurred, I relied upon both GIS data and extensively detailed geological and geographical maps of Japan. Accordingly, areas where nuclear powers plants could potentially be sited met four geologic, geographic and demographic criteria: (1) solid bedrock (and not alluvial plain), to ensure aseismicity; (2) distance from large population centers such as Osaka and Tokyo; (3) proximity to water, so that cooling towers could draw

in seawater to dissipate heat from the nuclear reactors; and (4) relatively low population density, to ensure the evacuation plans would be feasible.

I excluded a number of landlocked prefectures from the nuclear power plant potential sample subgroup of the $Y = 0$ set because of their lack of access to seawater (Tochigi, Gunma, Saitama, Yamanashi, Nagano, Gifu and Nara). I excluded others because of ground quality (Toyama), and an additional one because of the need for evacuation plans (Tokyo). Potential host communities for dams and similar water projects (river gates, rerouting, etc.) required bodies of water, and, when possible, bodies of water which extended across prefectural boundaries as the central government is most likely to build dams on "first grade" rivers which do so. Thus, I excluded Fukuoka and Nagasaki prefectures from possible dam locations. Airports required proximity to large urban centers along with suitable geographic conditions (no whole prefectures were excluded from the possible airport siting location subset). These balancing cases also matched the $Y = 1$ cases in terms of time; observations match on both spatial and temporal axes so that each case of an actual siting attempt in 19XX is balanced by a non-event in 19XX which has the same suitability for a controversial project.

4.2. *Civil society proxies*

I make *a priori* assumptions about civil society, namely that social capital is not distributed evenly within nations. Instead, the social infrastructure relevant for siting decisions is made up of autonomous, primarily local groups, the strength of which vary from locality to locality. I measure the strength of civil society using both measures of quality and relative capacity; groups may have one without the other. The *quality* of civil society is the strength and depth of bonds between citizens; neighborhood associations with high levels of participation, for example, can better monitor crime, push for upgrades to local facilities and maintain community standards than those with declining or non-active memberships.

Previous studies have shown that rapid population growth increases turnover (Hammel, 1990, p. 185), breaks apart community connections and increases alienation (Freudenburg, 1984). Rapid population changes due to events such as economic development are often associated with broad, negative social impacts such as increases in crime (Siegel and Alwang, 2005, p. 7), increases in gang population (Spergel, 1990, p. 232) and a breakdown in local networks. Areas which have maintained stable population levels are more likely to have intact social networks which allow citizens to overcome collective action problems and mobilize on issues, such as protesting against unwanted facilities. Localities experiencing a large influx of newcomers may be more likely to be targeted by authorities for controversial facilities because protest efforts in these communities are more vulnerable and more likely to fracture under pressure (Putnam, 1993; Munton, 1996, p. 307). Based on this research, I measure the quality of civil society in Japan as the change in population from 1950 until the time of the siting attempt.

The *quantity* or *relative capacity* of social capital can be determined through relative measures of the strength of such organizations' memberships *vis-à-vis* opponents and competing groups. Putnam (2000), for example, mourns declining membership and participation

rates in community, fraternal and civic organizations as signs of disengagement from political and public life. Sheingate (2001, p. 27) emphasizes that organizations with higher relative capacity maintain advantages over competing groups as such associations can better capture limited resources. For this study, the relevant civic groups most likely to be active in siting processes for controversial facilities are cooperatives made up of farmers and fishermen. Because the technical requirements for nuclear power plants, dams and airports regularly place these facilities in rural areas, these primary sector workers often participate in siting processes, and, more importantly, regularly join together in collectives and associations. In Japan, national laws provide fishermen's cooperatives (*gyogyō rōdō kumiai*) with veto powers over the siting process (Tsebelis, 2002); a majority must agree through a formal vote to a contract with site developers for the plant to proceed (Lesbirel, 1998).

Furthermore, the concerns of fishermen and farmers have been heightened by past accidents and by potential impacts upon their livelihoods. Developers sited all of Japan's nuclear power facilities on oceans, and the process of cooling the reactors draws in ocean water and expels waste water at a temperature of 6°C higher than standard water. Fishermen became alarmed over this practice after studies showed that plants released both hot water and radioactive elements back into the ocean (*NGSK*, February 1966, Vol. 10, No. 2; *Asahi Shinbun*, 23 March 1972). Along with fears about direct impact on their jobs and health, fishermen and farmers regularly express concern about "nuclear blight", i.e., the contamination of their produce and harvests and because of lost sales due to fears or rumors of radioactivity (cf. Tabusa, 1992, p. 244).

Political power can increase both with absolute (Acemoglu and Robinson, 2001; Fung, 2004) and relative (Sheingate, 2001) group size. Larger groups can amass more votes, donations as well as letter writers and protestors, and can better pressure state leaders and decision makers. When facing off against competing civil society organizations, relatively stronger groups can better acquire their goals. In reviewing potential host communities, however, the long-term capacity of voluntary associations, not just the size of relevant groups at the initial siting attempt, forms the core concern for state authorities. This is because siting times for facilities, such as Logan International Airport's additional runway or the Higashidōri nuclear plant in Japan, can stretch up to three decades (*AP News*, 18 April 2005; Lesbirel, 1998). Siting authorities analyzing potential sites for atomic reactors in Japan, for example, calculate that villages that suffer from problems like depopulation of fishermen, low community solidarity and pollution are less able to resist siting attempts which still might be ongoing in 20 years.

I measure civil society quantity as the change in employment in the percentage of workers employed in the primary sector from 1980 through 1995. Less than 1% of the primary sector in Japan is involved in non-fishing/farming practices (e.g., mining); therefore, measures of the primary sector capture the capacity of farmers and fishermen in the locality. Furthermore, because joint fishery rights and licenses for operations are granted almost exclusively to fishery associations (Ruddle, 1987), and because of economic and social pressures on farmers, membership rates in cooperatives and associations for Japanese farmers and fishermen are well above 98%. Changes in this percentage over time reflect the strength of fishermen and

farmers *vis-à-vis* their community and other potential competitors. 70% of the nuclear power plant siting attempts took place during this time period with the remainder taking place in the 1960s and 1970s; even for earlier attempts, this variable still measures the long-term viability of occupations in the first sector. Previous research on the siting of externalities relies on similar proxy variables when systematic data is not available. Hamilton (1993, p. 107), for example, uses the percentage of the voting age population that voted in the 1980 presidential election "to measure the potential for residents to overcome free-rider problems and engage in collective action."

4.3. *Political proxies*

I measure the presence of hegemonic and opposition party legislators through data on the number and percentage of such representatives in Japan's Upper House of Parliament. I measured over-time support for the Liberal Democratic Party by compiling a yearly, prefectural index of votes for LDP candidates in the Upper House (House of Councilors) and averaged each area's score between 1956 and 1989. I used Upper House election data as opposed to Lower House (House of Representatives) elections data for three main reasons. First, Upper House elections take place at regularly scheduled intervals, and their outcomes are not endogenous with election timing, as is often a problem with Lower House elections. Second, unlike the Lower House electoral processes, Upper House elections are non-personalistic and are seen to reflect party interest, not personal voting patterns (Curtis, 1971, 1999). Finally, Upper House election data map well onto prefectures thanks to the SNTV districting procedures. To analyze the effect of powerful hegemonic politicians, I tracked the number of politicians in the LDP serving six terms or longer in the Lower House. Those who do so are often referred to as *daijin*, or Cabinet-level politicians, in Japanese, because long tenure candidates regularly gain seats within the Cabinet. I separately measured the presence or absence of Prime Ministers from these localities.

Along with variables capturing civil society and political factors in the localities, I control for a variety of standard variables, such as district magnitude, population density, the area of the village or town and time period, which are defined in Table 1.

5. Results: Picking Sites

In analyzing the dataset, I build on previous work (Hamilton, 1993, p. 102; Lesbirel, 1998; Hamilton and Viscusi, 1999; Wolverton, 2002) which models the siting of public bads and controversial facilities as a function of demographic, political, economic and social factors. I use rare event logic (*relogit*) analyses to tease out the individual effects of factors related to civil society, economic, demographic and political variables because the siting process takes place in two binary-choice stages. Authorities make an initial choice of a host from among technically feasible areas. If excluded, a locality is out of the picture. If included, the process moves forward to the next round where local political, demographic and temporal factors shape the outcome and determine whether the siting succeeds or fails. Logistic regression involves a binary variable (selected/not selected in the first stage, successful/failed attempt in

Table 1. Descriptive Statistics of Siting Data Variables, 1945–1995

Variable	Description	Mean	Standard Deviation	Min.	Max.
Dependent Variables	*Siting Outcomes*				
Inclusion/Exclusion	Dummy variable; 0 if no attempt, 1 if attempt	0.494	0.500	0	1
Overall Siting Outcome	Three-step ordinal variable; 0 if no attempt, 1 if attempt failed, 2 if successful	0.875	0.935	0	2
Independent Variables	*Civil Society and Powerful Politicians*				
Civil Society Quality (Community solidarity)	% Population change from 1950 until the siting attempt	0.01	0.707	−0.78	6.378
Civil Society Capacity (Over-time changes in relative strength)	Change in percentage of primary sector employment, 1980–1995	−0.32	0.216	−0.88	0.623
Powerful Politicians	Number of LDP members serving 6+ consecutive terms	1.644	1.010	0	4
	Political, Economic and Demographic Characteristics				
Post-1975	Dummy variable; 1 if siting attempt in or after 1975, 0 if before	0.625	0.485	0	1
Town Area	Square kilometers	136	139.203	3	869.1
Population Density	Population per square kilometer	509.2	1,321.484	5.6	14,652
District Magnitude	Number of Lower House seats	4.097	0.816	2	6
Economic Growth	Change in tertiary sector, 1980–1995	0.155	0.193	−0.4	1.368
	Majority Party				
Over-Time Support	Average prefectural LDP vote share — Upper House elections, 1956–1989	0.517	0.084	0.27	0.678
Percentage in Lower House	Percentage of seats from the district held by LDP members	0.639	0.188	0	1
Number of Reps in Lower House	Number of LDP seats in the Lower House	2.566	0.840	0	5
Presence of Prime Minister	Number of LDP politicians in office during siting who served or would go on to serve as Prime Minister	0.114	0.332	0	2
	Opposition Party				
Socialists in LH	Number of Socialists in the Lower House	1.002	0.616	0	3
Communists in LH	Number of seats held by Communists in the Lower House	0.087	0.282	0	1
Other Party Members in Lower House	Number of seats held by other parties	0.417	0.685	0	4
	Minority Concentration				
Minority Representation (1)	Dummy variable; 1 if siting attempt in Hokkaido, 0 if not	0.072	0.259	0	1
Minority Representation (2)	Dummy variable; 1 if siting attempt in Okinawa, 0 if not	0.017	0.129	0	1

the second) and follows the Bernoulli probability function. Because the events under study here are rare, i.e., there are far more instances where Japanese towns were not selected as hosts for controversial facilities than those were, the standard logit form provides biased estimators. A rare events logistic, or *relogit*, model developed by King and Zeng (2001a,b) addresses these concerns.[2]

5.1. *Simulation, confidence intervals and estimate correction*

To enhance the presentation of results, rather than displaying conventional tables of coefficient estimators, I provide simulations and confidence intervals to produce more intuitive displays of the variables (with standard coefficient tables available in the Appendices). Confidence intervals allow investigators to "express the appropriate degree of certainty around … quantities", while simulation techniques allow us to "extract the currently overlooked information" and "interpret and present it in a reader-friendly manner" (King, Tomz and Wittenberg, 2000, p. 341). In simulation, we "learn about a distribution by taking random draws from it." Once we have taken the random draws, we can use them to approximate a feature of the distribution (Tomz and Wittenberg, 1999, p. 11). The predicted probability of interest is displayed as a solid line, with the lines bounding it on each side showing the 95% confidence intervals. For these simulations, I set all independent variables at their means except for the quantity of interest. The graphs found throughout this section are based on the results from the prior corrected estimators.

Prior correction and weighting comprise the two main methods for correcting estimates. Such additional techniques must be employed to "compensate for differences in the sample ($\hat{y}$) and population (τ) fraction of ones induced by choice-based sampling" (King and Zeng, 2001a, p. 144). Because prior corrections require proper model specification, it is slightly disadvantageous when compared to weighting (Xie and Manski, 1989). Although prior corrected estimators are more suspect than weighted ones because of the possibility of model misspecification, in many cases, analytic limits prevented the proper calculation of estimators using the actual weight correction (i.e., 0.0016). The smallest weighting value that would resolve computationally was far larger, at 0.006, than the actual frequency in the population.

5.2. *Results: Siting nuclear power plants in Japan*

For nuclear power plant siting attempts, civil society variables proved highly significant, while others did not. Within a pool of technically appropriate sites, developers in Japan select host communities for nuclear power plants based on the quality and relative capacity of civil society. In some cases, where powerful politicians can override decision making

[2]Another way to view the siting process is as a spectrum. Depending on the strength of organized civil society, some localities may be willing to accept, others less willing, and some completely unwilling to do so. To confirm that the coefficient estimates were not strongly affected by the two-stage relogit model type, I also carried out an ordered probit (oprobit) analysis with a three-category ordinal-dependent variable using the spectrum model. The results of the oprobit model, while not shown here, confirm that civil society factors proved most significant.

processes, political intervention draws these facilities into constituencies of long-time LDP incumbents. Authorities were most likely to attempt sitings of reactors in communities with low community solidarity and diminished or decreasing levels of social capital. In some cases, legislators who had served for at least six terms in office intervened in the siting process to bring these facilities into their districts.

Those communities which maintained or increased membership in civil society groups had a far smaller chance of being selected as hosts for nuclear plants. A community which merely sustained its population of fishermen and farmers over the measured time was almost 100 times less likely to be chosen as a site for a nuclear power plant than one which lost 80% of its capacity *vis-à-vis* other sectors, as Figure 1 displays.

The Japanese government and utility developers long recognized the importance of studying the concentration of first sector workers in potential public bad sites. When the Tokyo Electric Power Company (TEPCO) worked with the Ministry of International Trade and Industry (MITI) to site reactors in Fukushima prefecture during the early 1960s, it measured levels of commercial fishing and took into account membership in local fishing cooperatives. Arguments for siting in the area of Futaba-machi hinged on the point that it is "not an important area for fishing" (*NGSK*, 1964, Vol. 8, No. 6, p. 21). Similarly, when Chubu Electric Power Company began surveys of the Ashihama district near the Kumano Sea, they predicted that the area would be more amenable to nuclear power plant siting because of the paucity of fishermen's cooperatives there compared with the nearby village of Oshiraike (*NGSK*, 1964, Vol. 8, No. 8, p. 42). Nuclear plant developers bemoaned the fact that even though they had done their best to pick rural areas where resistance would be low, it was likely that local fishing cooperatives would cause "problems to arise over new projects". Fishermen sought to move the discussion beyond local siting issues when they

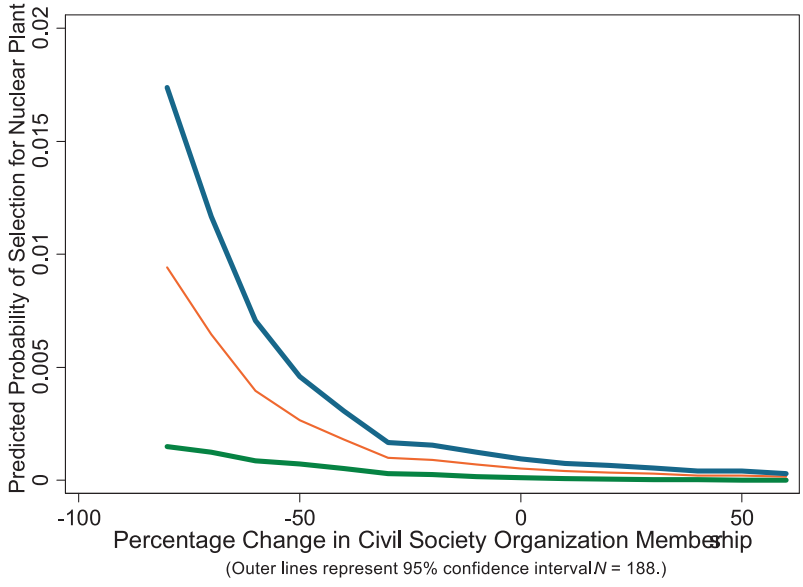

Figure 1. Authorities More Likely to Select Localities with Weaker Civil Society

organized a national forum of fishing unions to discuss the problem of siting (*NGSK*, 1966, Vol. 10, No. 11, p. 15).

As long as local fishermen and farmer cooperatives could at least maintain their relative strength over time, siting authorities judged them as able to fight off proposed public bads. On the other hand, nuclear power plant authorities were more likely to select areas facing diminished capacity of fishing and farming cooperatives as the site of a nuclear power plant, as indicated by the steep curve rising from the point where relative group strength drops by more than 20%. The village of Tomari on the northern island of Hokkaido, for example, experienced drastic relative losses in its fishing and farming associations, core groups within local civil society.

While initially a third of the village of Tomari had been members of fishermen and farmer's cooperatives, by 1995, less than 5% of the village remained engaged in those occupations (with little shift in the overall population). With fewer members of these voluntary associations to resist state plans, developers selected Tomari not for one, but for three nuclear power plants. On the other hand, the nearby village of Taisei, also on the northern island of Hokkaido, maintained close to one-fourth of its working population as fishermen and farmers over the same period, and, as a result of its stronger social capital, was not selected by authorities as a host community.

Along with capacity of local groups, the quality of civil society also plays a role in siting decisions for nuclear power plants in Japan. Areas with lower levels of interpersonal trust and fewer interconnections and local networks were more likely to be chosen as hosts, while those with stable, intact networks were better able to fend off selection. Figure 2 shows that localities which either lost overall population or maintained it were far less likely to be chosen for nuclear power plants than those facing increases of 70% or more. The town

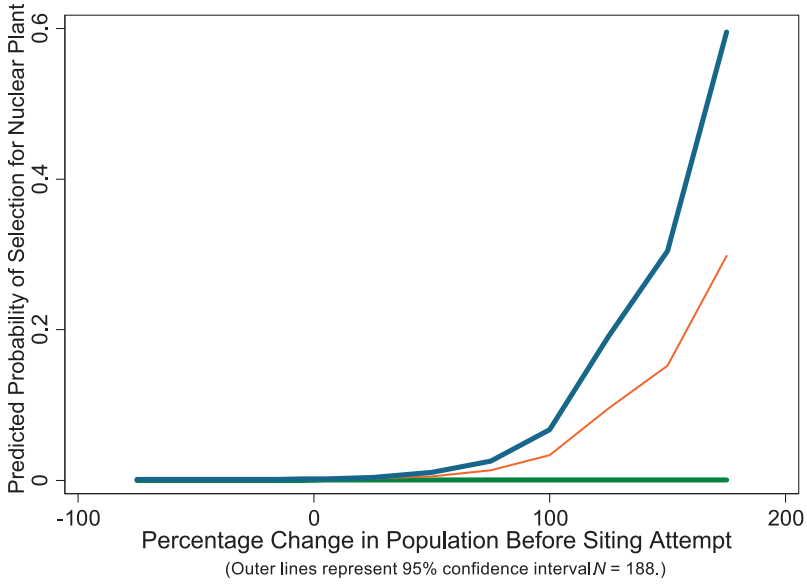

Figure 2. Authorities Select Communities with Weakening Social Ties

of Ohmiya in Saitama prefecture more than doubled its population over a 20-year period, a surge which weakened existing ties between neighbors. The influx of newcomers made it difficult to establish bonds with new residents, and without strong ties to facilitate area residents' cooperative mobilization together against a facility, developers selected it as a host community for a nuclear power plant. Similarly, the village of Kumatori near Osaka found its population swelling by 9,000 new residents over the pre-siting period, an event which increased its citizen base by more than 90%. Kumatori, like Ohmiya, was selected as a host for a nuclear power plant.

Areas with rapidly increasing populations are unable to maintain the social networks and ties which make mobilization and opposition easier. These communities are more likely to fragment under pressures such as offers of compensation, and hence, are less able to present a united front against siting.

While estimates of civil society strength (in terms of both quality and relative capacity) are the primary factors driving siting decisions, powerful legislators can intervene in the process and gently skew it to pull these projects into their districts. Powerful Liberal Democratic Party (LDP) politicians who served six consecutive terms or more are usually promoted to Cabinet-level positions. These conservative, pro-growth politicians regularly supported pro-nuclear mayors and urged local residents to see nuclear power as safe and necessary (*Nikkei*, 17 March 1981; *NGSK*, 1981, Vol. 3, p. 35). Communities with more of these well-known and prominent representatives are slightly more likely to be chosen as sites for nuclear power plants; Figure 3 shows that communities with no powerful politicians were six times less likely to be chosen than their counterparts with four or more such representatives.

While folk theorems — often premised on the American electoral system — argue that powerful politicians should shield their constituents against these often dreaded facilities

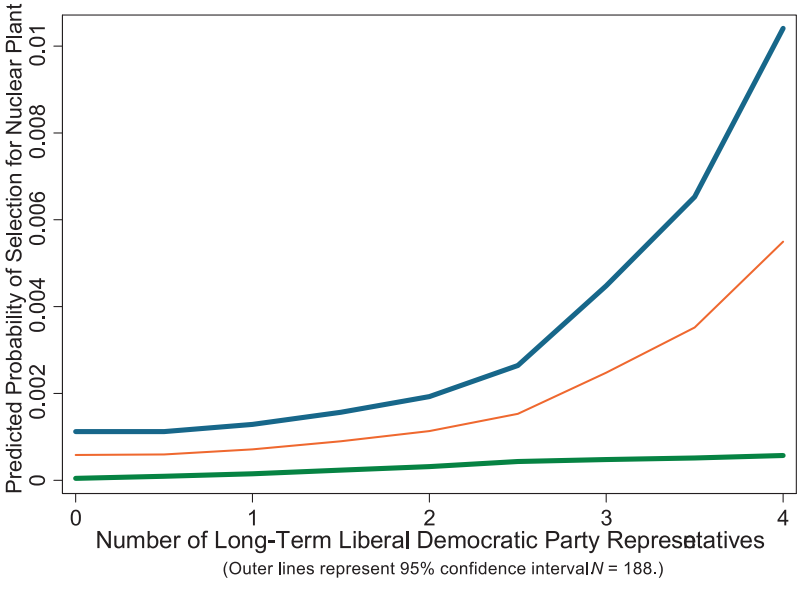

Figure 3. Having More Powerful Legislators Increases the Probability of Political Intervention

(and instead bring in facilities like docks and bridges), support from the business community pushes politicians to seek them out. As one researcher argued, "many local politicians in Japan … actually benefit politically and electorally from actively promoting noxious facilities in their own electorates because of the economic benefits yielded" (Lesbirel, 1998, p. 8). In many interviews, LDP Diet members discussed their strong support for these projects and argued forcefully against seeing them as unwanted or controversial facilities (*meiwaku shisetsu* in Japanese) (Interviews, 2002–2003). Powerful politicians like former Prime Minister Kakuei Tanaka openly discussed their successful drive to bring nuclear projects to their electoral districts (Tanaka, 1972; Schlesinger, 1997, pp. 72 and 103).[3] The town of Kashima in Shimane prefecture, though it has lost only around 17% of its fisherman and farmers, and actually slightly decreased the population, was nonetheless selected as a host for nuclear power plants, evidently because of the power of its four long-term, incumbent LDP representatives in the national legislature.

The politicians from Kashima included Noboru Takeshita, who would become a powerful Prime Minister, and some lesser known long-term incumbents, such as Yoshi Sakurauchi. Similarly, the town of Kariwa in Niigata prefecture had four politicians who served six or more terms, including the openly pro-nuclear Kakuei Tanaka (another Prime Minister), and the lesser known Shin Sakurai. Kariwa and its sister city of Kashiwazaki ended up hosting seven plants. Interestingly, electing a powerful legislator who becomes prime minister is not sufficient to override the siting process; rather, it requires several powerful legislators to do so.

5.3. *Results: Siting airports in Japan*

My analysis of airport siting cases in Japan reveals that the relative capacity, more than quality, of local civil society strongly affects siting decisions. As with other public bads, once authorities have excluded non-suitable sites for airports, they do not place them in areas heavy with minority group concentrations as political discrimination against minority opposition parties, or based on local economic factors. Figure 4 shows that areas with weakening relative capacity of fishermen and farmers were far more likely to be selected as host communities for airports than their counterparts with stronger fishing and farming communities. A community which lost more than 75% of its relative strength of cooperative and union members is more than 10 times as likely to be chosen as the site for an airport.

Farmers make up the largest number of first sector workers affected by airports which, because of their need for vast, open spaces, regularly expropriate available farmland. In Chiba prefecture, where authorities located Tokyo's Narita Airport, the agricultural sector actually increased over the decades preceding the airport's announcement. Following World War II, many demobilized soldiers and repatriated colonial families were brought to the area, which was partly an imperial estate, to work as farmers. In an uncommon display of

[3]Tanaka also displayed his savvy at pork barrel politics when he set up the Local Development Subcommittee in the House of Representatives in 1949 to assist the siting of hydroelectric dams and other public works projects in home districts (Calder, 1988, p. 301).

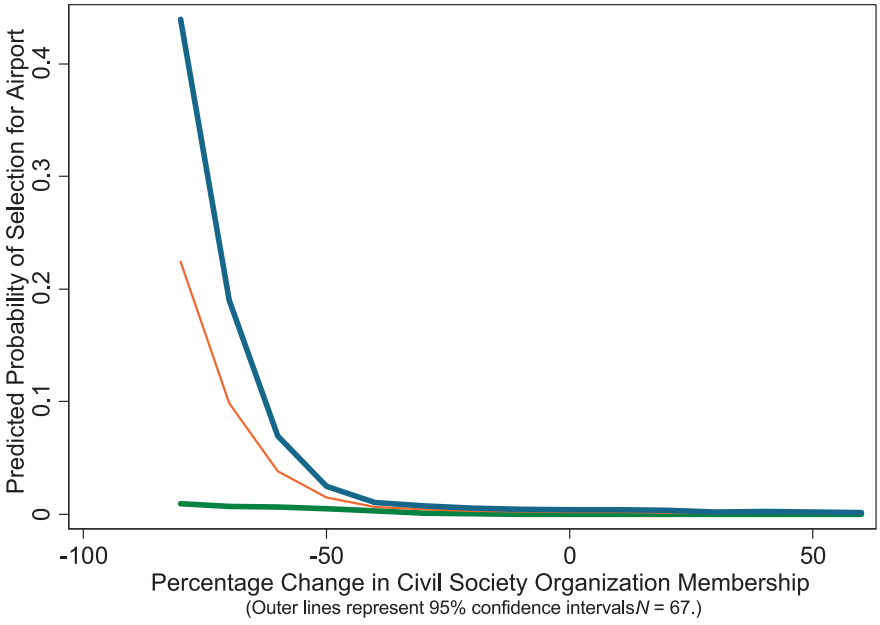

Figure 4. State Selects Localities with Weaker Local Civil Society for Airports

violent resistance, these farming communities quickly mobilized to resist the siting of the airport, delaying its opening by more than seven years and leading to nearly 30 years of conflict with state security forces. The strong violence during the Narita siting attempt was surprising to many observers of Japanese politics (Apter and Sawa, 1984). However, given the increasing numbers of farmers in the period before the siting attempt took place, this model would predict that siting would be difficult.

5.4. *Results: Siting dams in Japan*

In dam siting cases, none of the variables under investigation, including civil society, political and minority discrimination and economic conditions, proved significant. Instead, the size of the locality in which the dam is proposed best explains which locality will be chosen from among a pool of similarly suitable sites. Cities and villages with more square kilometers of land were more likely to be chosen than those with less. I speculate that localities with larger areas have a larger supply of land, resulting in lower prices for the state and other dam developers who seek to purchase acreage. Further research could gather direct real estate prices for the 500 or so towns under study here to clarify the role played by land prices in site selection.

5.5. *Confirming the direction of causality*

Observers may be concerned that the actual direction of causality in the relationship between the civil society proxy and the probability of selection as a host community is the reverse of

what I had described. Perhaps the siting of a nuclear power plant or airport actually decreases the population of first section workers, which I use as a proxy for civil society. To test this argument, I use propensity score matching and average treatment effects. Matching produces balance between control and treatment groups and provides an alternative to standard analysis techniques even in observational studies (Rosenbaum and Rubin, 1983, 1985; Angrist and Krueger, 1999, pp. 1314–1315). We estimate average treatment effects (ATE) on the treated units "by averaging within match differences in the outcome variable between the treated and untreated units" (Abadie and Imbens, 2002, p. 1).

Using nearest neighbor matching, the effect of siting a public bad on the percentage change in primary workers over the 1980 to 1995 period was −0.0665, a figure statistically significant at the 0.003 level. That is, the placement of a nuclear power plant, dam or airport in a locality is responsible, on average, for a decrease of less than 7% in the employment rates of farmers and fishermen there. There is a feedback effect on local fishermen and farmers from siting, but it is a minor one. For example, all other factors being equal, a 7% decrease in the concentration of workers in the primary sector has little effect on the probability of selection as host community; the threshold effect for locational inclusion for nuclear power plants, for example, is closer to −30%. Given that the average locality in this dataset saw a decrease of more than 20% in its primary employment over that time period, I believe that concern about reverse-causality is misplaced. Public bad siting is primarily a function of the health of the primary sector, which measures civil society strength, and not vice versa.

6. Results: Success or Failure of Siting Attempts

Having investigated the role that civil society plays in the selection of sites for nuclear power plants, airports and dams, I now seek to investigate if these same factors play a role in affecting the completion or failure of the proposed project. While states avoid siting in areas with stronger local horizontal associations, enhanced social networks and fewer powerful politicians, how these same social capital characteristics affect the **outcomes** of siting attempts has not been thoroughly explored. It may be, for example, that state forecasts of resistance are inaccurate, and that areas with stronger civil society may be no better equipped to fight off the proposed facility than those with weaker social ties.

If a developer seeks to place a public bad in an area with relatively strong horizontal associations, how will it fare? As predicted by arguments about the impact of civil society upon the state policies, Figure 5 shows that localities in Japan with higher quantities of civil society are better equipped to fend off siting attempts of all three types of facilities. Areas that can maintain or increase the relative strength of farmers and fishermen's cooperatives decrease the probability that a proposed public bad will come to completion in their locality. For example, an area selected as the host community for a nuclear power plant, dam or airport which has lost close to three-quarters of its civil society membership has close to a 95% chance of seeing that facility come online. However, an area that has increased its membership in these NGOs and cooperatives by half has a 70% chance of stopping these projects.

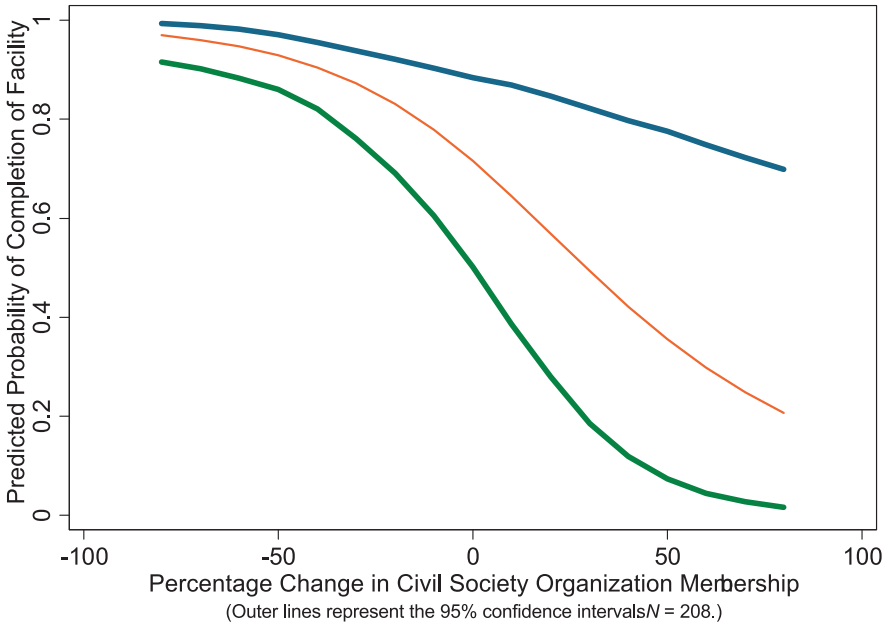

Figure 5. Stronger Civil Society Decreases Likelihood of Siting Success

Another important factor in determining the outcome of siting attempts is the history of other public bads in the area. Once an initial public bad is located in a town or village, the choices of additional public bads being successfully located in that area jump drastically, as seen in Figure 6. Localities with an existing facility were most likely to see a new facility come to completion. An area which already has one nuclear power plant is far more likely to allow the siting of additional plants than those which have none. This figure shows how moving from having no prior public bads to a single one increases the probability of a new, proposed facility being completed successfully by more than 20%. After hosting two controversial facilities, the success of future attempts is all but assured. This behavior helps explain the large clusters of public bads in single areas, especially nuclear power plants, in Japan, where we often see groups of six or seven reactors within the same community.

The locality of Kashiwazaki-Kariwa in Niigata prefecture currently hosts seven nuclear reactors. Such clustering may be due to *habituation*, so that additional projects no longer entail large political costs because locals become used to the idea of such a facility and engage in less opposition to further facility siting. This could also indicate a sense of fatalism, where communities believe that they will not be able to stop future projects, dampening activism. Alternatively, the community may have developed "skill sets" from the siting of the initial project, such as how to extract additional rents and revenues from the central government[4] and how to overcome small but vocal opposition, so the later projects encounter less resistance.

[4]Some observers describe local government officials learning how to extract additional resources from the Japanese central government under threat of sabotaging or stalling additional facilities.

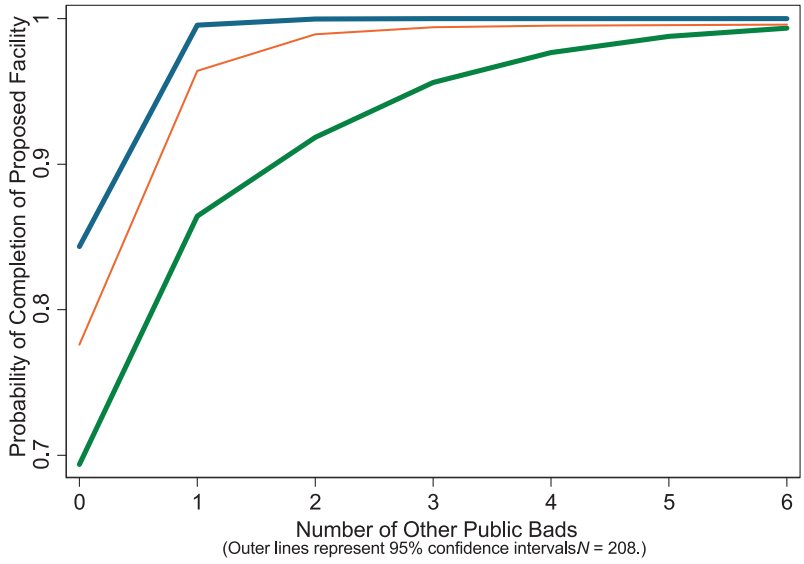

Figure 6. Presence of Other Public Bads Increases Likelihood of Future Siting Success

Citizen activists criticize this as "addiction" because local communities become used to spending beyond the normal budgets with the additional income brought by new public bads (Hasegawa, 2004, p. 27). As a result, they are forced to take on additional projects to maintain their spending levels and avoid going into debt.

7. Conclusions

This paper has tested six major theories which seek to explain site selection for controversial facilities along with investigating the factors that increase or decrease the chances of a proposed project coming to completion. Based on these results, while it may be accurate to argue that neutral, non-political criteria such as geographic and geological features exclude inappropriate sites, as bureaucrats and state agencies often claim, placement within technically feasible locations is not random. Once the necessary technical features for sites have been taken into account, other factors strongly impact siting decisions.

States initially choose locations for their controversial facilities from a set of technically feasible sites based on measures of the strength of civil society at the local level. Especially with the most dreaded and contested projects — nuclear power plants — civil society proves to be the most critical of a number of possible explanations for how sites are chosen. The strength of civil society organizations such as fishermen's and farming cooperatives and the solidarity between neighbors in a community regularly and measurably impact state siting policies. States around the world, such as the United Kingdom, undertake similar investigations to estimate potential opposition within civil society, sometimes through straightforward surveys (Rüdig, 1994, p. 84). French authorities may have selected several localities in Normandy based on survey research which showed towns in that area to be more favorable to

siting than in other regions (data reproduced in Hecht, 1998, p. 248). While evidence supports civil society strength as the core siting characteristic in cases from multiple nations, in some cases, a sufficient number of powerful politicians can override standard siting logics to draw in projects that they — but perhaps not most of their constituency — imagine as beneficial.

The data did not support other standard theories of site selection. I find no evidence that the dominant Japanese political party, the Liberal Democratic Party (LDP), punishes opposition-supporting localities by siting more unwanted projects in their backyards. Given the small numbers of minorities in Japan and the technical requirements for these large-scale projects, authorities did not measurably discriminate against minorities when siting these projects, as none of these facilities can be located in large cities where Koreans, *burakumin* and other ethnic minorities live.[5] Further, second-level tests of the environmental racism hypothesis uncover no systematic attempts to locate nuclear power plants, dams or airports in Hokkaido and Okinawa, areas known for their minority populations.

The evidence presented here does not confirm that economics determine siting outcomes for these types of projects in Japan. In Japan, economic conditions in communities selected for these public bads differ little from similar nearby rural towns. Towns selected as nuclear power plant host communities, for example, have around 41% of their workers in white collar occupations, on average only 1% less than towns meeting the same technical requirements that were not selected as hosts for reactors. Studies of waste facility siting in Canada similarly dismissed claims that siting was based on economic disadvantage whether measured in terms of income or unemployment (Castle and Munton, 1996, p. 78).

Localities with strong civil society, both in terms of its quantity and quality, represent the biggest challenge to long-term siting plans for controversial facilities. Such localities are more expensive targets for state authorities and developers in terms of both time (contacting, negotiating with or coercing the individuals) and money (if redistribution is used). Areas with diminished civil society, on the other hand — perhaps because of worsening local environmental conditions, shifting demographics or diminished market conditions — seem to serve as ideal hosts for such projects. If technically possible, the state will place the project in an area with absolutely no local, anti-facility civil society groups, such as in a remote location or offshore. The majority of Japanese airports built in the last ten years, for example, have been placed either offshore or in areas already containing a public bad,

[5] Of course, this does not indicate that siting decisions never involve racism or discrimination. Finding evidence for siting discrimination against minorities in Japan is difficult, as its four recognized ethnic and demographic minorities — Okinawans, Ainu, Koreans and *burakumin* — together comprise only 5% of Japan's population. Many Okinawans remain in the island chain once known as the Ryukyus, indigenous Ainu people are clustered in Hokkaido, while Koreans and *burakumin* are often found in neighborhoods of metropoles like Kyoto, Osaka and Tokyo. Stories of ethnic, occupational and social discrimination against these groups are common, and many Okinawans argue that they have been burdened with the brunt of the North American military presence because of long-difficult relations with Japan's main island. However, given the necessary geologic constraints of nuclear power plants, dams and airports, siting them in densely populated urban areas such as Tokyo and Kyoto — which also house large numbers of *burakumin* and Korean residents — is impossible.

such as a military base.[6] In North America, developers have sought to place public bads — such as the Palo Verde nuclear power plant complex in Arizona's desert, the yet-to-open nuclear waste facility in Yucca Mountain, NV, and the new Denver airport — in sites almost completely free of population. Authorities recognize the benefits in avoiding areas with the potential for opposition; as a result, "[a]ll of the new airports built in US urban areas during the 1960s and 1970s" were sited to avoid potential resistance from local civil society (Altshuler and Luberoff, 2003, p. 204).

Once a location has been chosen for a public bad, the strength of social capital again impacts state policy by increasing (or decreasing) the probability that the facility will be completed. As imagined by state planners, areas with strong civil society groups better resist siting attempts than those areas that are losing members. Further, the history of the community in terms of other public bads makes it more or less likely to be able to resist further siting attempts. Once a single public bad has been placed in a community, the chances are very good that the community will receive additional controversial facilities in the future. This model maps well onto empirical observations of communities in North America and Japan that have "clusters" of public bads, such as the area known as "Cancer Alley" in Louisiana that has a high concentration of chemical and petrochemical industries.

This analysis is important for several reasons. This argument is consistent with claims from the environmental racism literature that authorities often seek out communities with less political power. Here, I refine these arguments and push analysts to look less at race and ethnicity and more at the political patterns of representation and civil society organization strengths in those localities. Next, this paper demonstrates that interest groups, such as local fishermen's cooperatives, play a role in the siting process, despite common perceptions of Japan as a "strong state" in which bureaucracies (by themselves, or in alignment with private firms) determine overall policy outcomes (Johnson, 1982; Zysman, 1983). Finally, this article shows that the Japanese state closely monitors local political and demographic conditions in the process of siting, and hints at larger interactions between the state authorities and local civil society groups, including the use of a variety of state policy instruments to handle contestation with restive citizens (Aldrich, 2008).

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[6]Many of the large-scale airports managed by the Ministry of Transportation were previously military bases which were "converted" into civilian airports, including Haneda Airport in Tokyo, Nagoya Airport and Osaka International Airport.

panels at Harvard University, Tulane University, the Northeastern Political Science Association, and as a Weatherhead Center for International Affairs (WCFIA) working paper. I also wish to thank two anonymous referees who provided helpful comments on the paper.

Appendix A. Estimated Variable Coefficients

Table A1. Dependent Variable: Selection/Exclusion as Nuclear Power Plant Host

	Model 1 [Relogit with prior correction between 0.001 and 0.002]	Model 2 [Relogit with weighting correction of 0.006]
Town Area	−0.0003241	0.0003098
	0.001842	0.0018185
Population Density	−0.0023	−0.0024981
	0.0015077	0.0019343
Civil Society Quality	1.989807*	2.200953
	1.034305	1.94888
Civil Society Capacity	−3.489774***	0.4176255
	0.8646016	1.627666
Economic Growth	0.56776	−2.573052
	1.209316	1.81934
Over-Time LDP Support	2.619029	−0.4385572
	2.888152	4.467387
District Magnitude	−0.0182725	−0.8009795*
	0.3213291	0.4136665
Number of LDP Reps. in Lower House	−0.2919882	1.604455**
	0.3778273	0.5283282
LDP Percentage in Lower House	0.6160664	−23.65829***
	3.094655	6.373597
Presence of Prime Minister	−0.7314152	0.459709
	0.6485319	0.9180108
Post-1975	0.5005074	0.6031902
	0.3594831	0.5853791
Number of Socialists in LH	−0.2196648	−5.185023***
	0.6935033	1.619097
Number of Communists in LH	0.8248305	−2.467234
	1.087051	1.530033
Other Party Members in Lower House	0.1418938	−3.46013*
	0.7089351	1.298162
Presence of Powerful LDP Member	0.5660802*	0.5315239
	0.263649	0.3177857
Environmental Racism (1)	0.6175789	−0.7922523
	1.02494	1.131049
Constant	−2.362532	17.01205
	2.786823	6.649335

Note: $N = 188$. Robust standard errors underneath coefficients. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$.

Table A2. Dependent Variable: Selection/Exclusion as Host for a Dam Facility

	Model 1 [Relogit with prior correction between 0.001 and 0.002]	Model 2 [Relogit with weighting correction at 0.006]
Town Area	0.0059299***	0.0060109***
	0.0014937	0.0015581
Population Density	−0.0000403	−0.0000287
	0.0002125	0.0003592
Civil Society Quality	0.0843514	0.0491886
	0.2834704	0.3937763
Civil Society Capacity	0.934604	1.601061
	0.7857395	0.8309749
Economic Growth	0.4346639	1.139615
	0.6633055	0.7136825
Over-Time LDP Support	1.473614	−0.8608797
	2.189261	2.784575
District Magnitude	0.8189674	0.6387812
	1.003085	1.87093
Number of LDP Reps. in Lower House	−0.5533782	−0.0737293
	1.103293	1.52788
LDP Percentage in Lower House	0.1156739	−0.8111397
	2.878367	6.055634
Presence of Prime Minister	0.3200323	−0.1441134
	0.5085494	0.506714
Post-1975	0.6867754*	0.7923555*
	0.3147565	0.3743617
Number of Socialists in LH	−1.054791	−0.8141248
	1.077583	2.602589
Number of Communists in LH	−0.1065617	0.3255861
	1.140423	2.765684
Other Party Members in Lower House	−0.4500189	−0.1921563
	1.091983	2.544873
Presence of Powerful LDP Member	−0.0348423	−0.0008165
	0.1717304	0.2097103
Environmental Racism (1)	−1.199597	−1.415939
	1.009924	1.029208
Constant	−2.482201	−6.688835
	2.271057	4.449462

Note: $N = 213$. Robust standard errors underneath coefficients. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$.

Table A3. Dependent Variable: Selection/Exclusion as Host Community for an Airport

	Model 1 [Relogit with prior correction at 0.006 to 0.007]	Model 2 [Relogit with weighting correction at 0.02]
Town Area	0.001305	−0.0029074
	0.0022894	0.0051394
Population Density	−0.0001811	−0.0010237**
	0.0001787	0.0003961
Civil Society Quality	1.314873	0.1640791
	0.8345446	1.465862
Civil Society Capacity	−6.615531**	11.58776**
	2.830933	3.760149
Economic Growth	1.226662	7.362974
	1.982862	5.816747
Over-Time LDP Support	−1.617444	−11.80773
	3.172469	7.406782
District Magnitude	−1.762921	0.9206941
	1.907267	3.408477
Number of LDP Reps. in Lower House	2.678297	−1.418932
	2.728213	4.497367
LDP Percentage in Lower House	−12.23104	13.34968
	11.41597	22.16078
Presence of Prime Minister	1.316881	−2.105263
	1.055641	1.673245
Post-1975	0.1228211	0.6163004
	1.041312	2.712982
Number of Socialists in LH	−0.4470351	3.163193**
	0.8511377	1.205114
Number of Communists in LH	−2.078514	3.743177
	1.448118	2.693259
Presence of Powerful LDP Member	−0.6942819	1.484187*
	0.4523729	0.6454545
Environmental Racism (1)	0.8286388	−5.137684*
	1.206685	2.153679
Constant	7.060731	−6.416552
	8.50982	21.1947

Note: $N = 67$. Robust standard errors beneath coefficients. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$.

Table A4. Dependent Variable: Success/Failure for All Three Project Types

	Model 1 [logit analysis]	Model 2 [logit analysis]
Public Bad Density	2.561819**	
	0.9524071	
Town Area	0.001957	0.001495
	0.0017393	0.0016556
Population Density	0.0000325	0.0000137
	0.0001743	0.0001603
Civil Society Quality	−0.3827791	−0.4682316
	0.3880159	0.3722002
Civil Society Capacity	−1.93346*	−2.855864**
	1.016933	0.950908
Economic Growth	2.14386	2.216475
	1.235862	1.178375
Over-Time LDP Support	−0.9586738	−0.3063788
	2.881386	2.906257
District Magnitude	−0.7398749	0.1112507
	0.6421896	0.5235254
Number of LDP Reps. in Lower House	1.709422	0.5911211
	0.7642574	0.5529234
LDP Percentage in Lower House	−2.206717	0.0358462
	3.782558	3.333813
Presence of Prime Minister	1.057895	1.36258
	0.7300383	0.7134937
Post-1975	−0.9919188**	−0.5266241
	0.4034646	0.3748317
Number of Socialists in LH	1.075158	0.3662007
	0.9914259	0.8901509
Number of Communists in LH	0.6623503	−0.1034136
	1.09405	1.015997
Other Party Members in Lower House	0.5680249	0.059228
	0.9586764	0.8765908
Presence of Powerful LDP Member	−0.8808299***	−0.8828893***
	0.2591185	0.2587972
Environmental Racism (1)	−0.2873075	−0.1771975
	1.012537	1.024046
Constant	0.7211695	−0.8062824
	2.970448	2.720757

Note: $N = 229$. Robust standard errors beneath coefficients. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$.

Appendix B. Data Sources

Political data

Steven Reed, *Shūgiin Giin Sōsenkyo Kōhoshabetsu Tokuhyō Kekka* 1947–1995 [Japan Election Data, House of Representatives, 1947–1995], Takayoshi Miyagawa, *Shō senkyoku Handobukku* [Handbook of Single Member Constituencies] (Tokyo: *Seiji Kōhō Sentā* [Center for Political Public Relations], 1996), and direct surveys of mayoral offices, gubernatorial offices, and fishing cooperatives (carried out by the author, June 2002–September 2003).

Facility data

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